Operation & Service Manual

040-0224-01 Rev. C

- **Read this manual before use.**
- **Keep this manual with the machine at all times.**

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Preface

Safety

Please read this page before preparing your arcade cabinet for game play.

The following safety instructions apply to all game operators and service personnel. Specific warnings and cautions will be included throughout this manual.

Use the following safety guidelines to help protect the system from potential damage and to ensure your personal safety:

- Electronic components in the game cabinet, **except** inside the Mini-Motion base, run on 115 VAC. The voltage switch on the back of the computer must be set to 115. If you power up the computer outside of the cabinet, set the switch to match the local AC voltage:
  - 115 volts / 60Hz in most of North and South America and some Far Eastern countries such as Japan, South Korea and Taiwan
  - 230 volts / 50Hz in most of Europe, the Middle East and the Far East
- To help prevent electric shock, plug the system into a properly grounded power source. These cables are equipped with 3-prong plugs to help ensure proper grounding. Do not use adapter plugs or remove the grounding prong from a cable. If you must use an extension cable, use a 3-wire cable with properly grounded plugs.
- To help protect your system from sudden increases and decreases in electrical power, use a surge suppressor, line conditioner or Uninterruptible Power Supply (UPS).
- Be sure nothing rests on the system's cables and that the cables are not located where they can be stepped on or tripped over.
- Keep your system far away from radiators and other heat sources.
- Do not block cooling vents.
- Do not place the game in an area where a water jet would be used or use a water jet to clean the game.

Precautions for Game Operation

GLOBAL VR® assumes no liability for injuries incurred while playing our games.

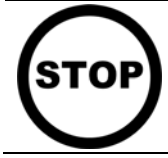
Operators should be aware that certain health and physical conditions may make people susceptible to injury when playing video games, particularly when the game moves or creates a sense of motion.

Warnings

To avoid electrical shock, unplug the cabinet before performing installation or service procedures.

For Mini-Motion Systems, Unplug BOTH AC Power Cords.

If the power cord is damaged, it must be replaced by the equivalent power cord available from GLOBAL VR or your distributor.



GLOBAL VR assumes no liability for any damages or injuries incurred while setting up or servicing the cabinet. Only qualified service personnel should perform installation or service procedures!

Environmental Conditions

Cabinet is intended for indoor use only. Be sure to keep the cabinet dry and maintain operating temperatures of 59°-86° F (15°-30° C).

FCC Notices (United States)

Electromagnetic Interference (EMI) is any signal or emission radiated in free space or conducted along power or signal leads, that endangers the functioning of radio navigation or other safety service, or that seriously degrades, obstructs, or repeatedly interrupts a licensed radio communications service. Radio communications services include, but are not limited to, AM/FM commercial broadcast, television, cellular services, radar, air-traffic control, pager, and Personal Communication Services (PCS). These licensed services, along with unintentional radiators such as digital devices (including computer systems) contribute to the electromagnetic environment.

Electromagnetic Compatibility (EMC) is the ability of items of electronic equipment to function properly together in the electronic environment. While this computer system has been designed and determined to be compliant with regulatory agency limits for EMI, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference with radio communications services, which can be determined by turning the equipment off and on, you are encouraged to try to correct the interference by one or more of the following measures:

- Re-orient the receiving antenna.
- Relocate the cabinet relative to the receiver.
- Plug the game into a different outlet so that the computer and the receiver are on different branch circuits.

If necessary, consult a Regulatory EMC representative of GLOBAL VR® or an experienced radio/television technician for additional suggestions. You may find the FCC Interference Handbook, to be helpful. It is available from the U.S. Government Print Office, Washington, DC 20402.

This device has been tested and complies with the limits for a Class A digital device pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy. If not installed and used in accordance with the instruction manual, it may cause harmful interference with radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case you will be required to correct the interference at your own expense.

Operation is subject to the following conditions:

- This device may not cause harmful interference.
- This device must accept any interference received, including interference that may cause undesired operation.

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Chapter 1 — Introduction

Loops and leaps are front and center in this high-flying racing game. High powered F-Jet racers provide a totally realistic racing experience with fine-tuned handling, air controls and over-boosted engines. Single players can enjoy the heart-pounding action or heighten the competition by linking up to 4 game cabinets. Standard racing rules apply...but that is the only thing standard in this ***Twisted*** game!

Twisted – Nitro Stunt Racing is the first game available in GLOBAL VR's Mini-motion cabinet configuration. Taking up no more space than than a deluxe 42" game, Twisted Mini-Motion takes players to the next level by including the physical bumps, twists, and turns of this fantastic racer!

Game features include:

- Players can drive 4 different F-Jet all terrain racing beasts
- Aerial handling and collision
- 8 Race Tracks each with their own characteristics
- Tackle enormous jumps, huge loops, ramps, pipes
- Multiple surfaces types - asphalt, mud, sand, grass, metal

Cabinet Specifications

Figure 1. Cabinet Dimensions and Weights

Current Requirements (Approximate)

Voltage	42" Mini-Motion Cabinet		42" Non-Motion Cabinet		32" Cabinet	
	Inrush	Operating	Inrush	Operating	Inrush	Operating
115 VAC	7.5 Amps	6 Amps	7 Amps	5 Amps	6 Amps	4 Amps
230 VAC	4 Amps	3 Amps	3.5 Amps	3 Amps	3 Amps	2 Amps

Hardware Features

- Dual-core Pentium® computer
- Nvidia® GeForce® graphics
- 32" or 42" LCD monitor
- Supports dollar bill validator
- Easy Installation
- 6-Channel Surround Sound Audio
- Force-Feedback Steering
- Link up to 4 Cabinets
- **NEW Mini-Motion System Available!**

Cabinet Installation

Unpack and Inspect Cabinet (All Cabinets)

1. Carefully remove the cabinet from the shipping container, giving yourself plenty of space. Inspect the exterior of the cabinet for any damage.
2. Remove the keys from the coin return slot. Open the coin door to locate the second set of keys.

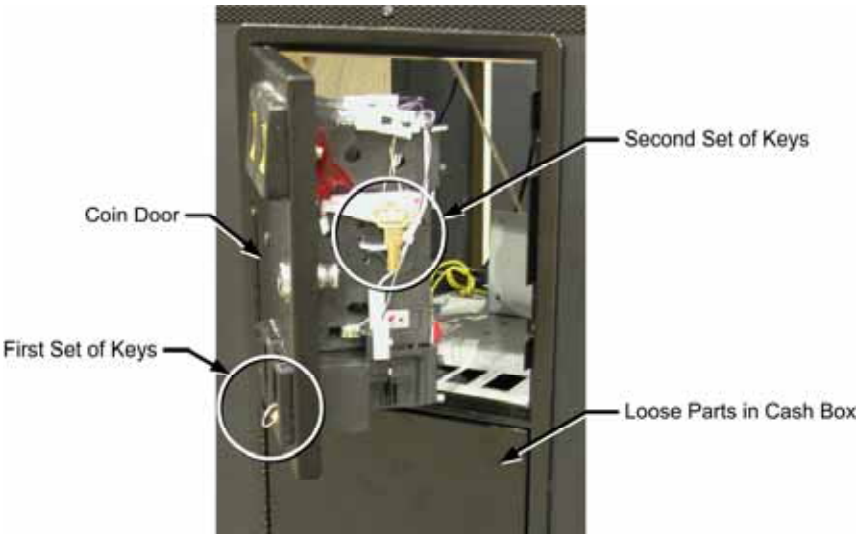

Figure 2. Coin Door with Key Location

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3. Locate the loose parts inside the cash box or in separate packaging. You should find the following items (may vary with cabinet style):

   - CAT-5 Network Cable
   - AC Power Cord (2 AC Cords for a Mini-Motion Cabinet)
   - Operation & Service Manual (This Document)
   - Software Restore Guide
   - Mini-Motion Base Service & Repair Manual (Motion Cabinet Only)
   - System Recovery Disk (1 CD)
   - Game Install Disk (1 DVD)
   - Hardware for Securing Display Cabinet and Seat Cabinet together.
   - **32" Cabinet Only:** Three 1/4-20 x 1" Torx screws with lock washers and flat washers for securing Marquee

4. It is advisable to check inside the cabinet in case any components have shifted or come loose during shipping. Remove the doors from the back of the cabinet and verify that all components are securely mounted, and all cables and wires are securely connected. See pages 85—88 for wiring and connection diagrams.

5. To test operation before installing the seat, connect the display cabinet AC power cord from the cabinet to a grounded (3-terminal) AC outlet and turn ON the ON/OFF switch on the lower rear of the cabinet. For Mini-Motion Systems turn on only the Display Cabinet Power Switch.

6. Verify that the game boots properly and the Attract Movie starts. If any error messages appear, see page 21 for more information. (Ignore the "Motion Hardware Not Found" error message if you boot a Mini-Motion system without the Mini-Motion base connected.)

   Note: If you get a "Motion Hardware Not Found" error message but your cabinet is NOT a Mini-Motion system, you probably have a Motion Dongle. Check **Cabinet Type** in the **Machine Settings: Info** screen in the Operator Menus. Contact Technical Support if you need to exchange your Game Dongle.

7. Turn the cabinet OFF and disconnect the power cord before continuing with installation.

Marquee Setup (32" Cabinet)

WARNING: Keep hands clear of area under marquee as you rotate it into place.

1. Rotate the marquee up towards the front of the cabinet, as shown in the figure below.
2. Secure the marquee with three (3) 1/4-20 x 1" Torx screws with lock washers and flat washers through the holes in the metal bracket below the marquee, as shown below.

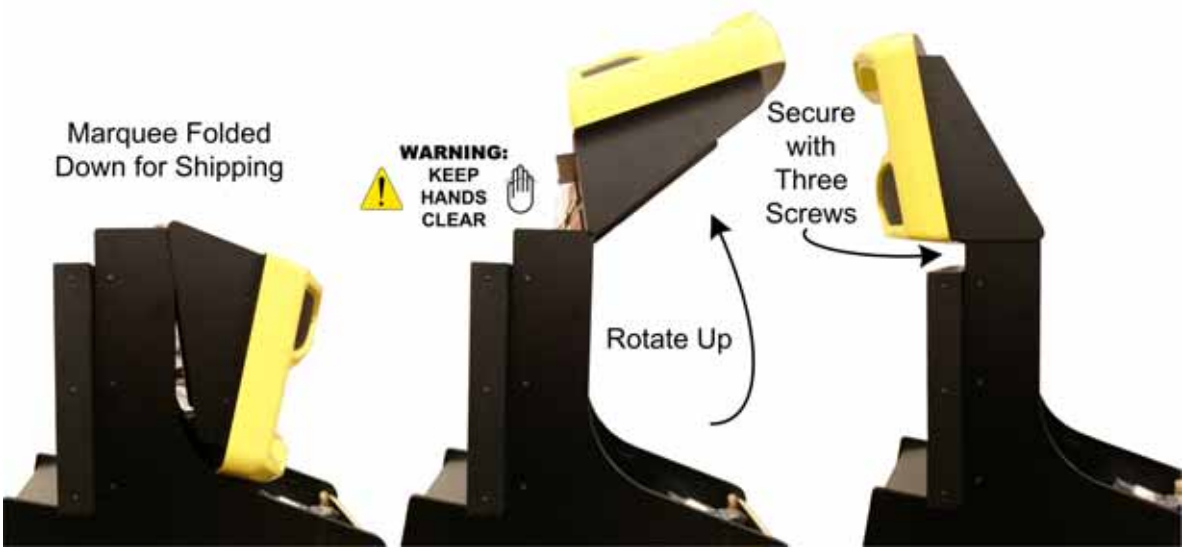

Figure 3. Setting up the Marquee (32" Cabinet Only)

Seat Assembly Installation (Non-Motion Cabinet)

1. Insert the seat runners so that they extend out from the cabinet, as shown below. Secure each runner with four (4) 1/4-20 x 1-1/4" hex-head bolts with lock washers and flat washers.

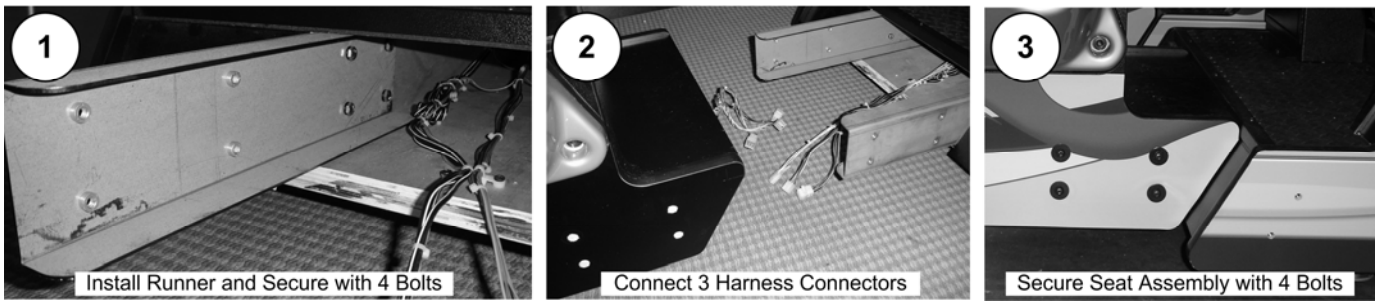

Figure 4. Installing the Seat Runners (32" Cabinet)

2. Slide the seat assembly onto the seat runners, leaving enough space to connect the harnesses.
3. Connect the three (3) harness connectors between the Display Cabinet and seat assembly.
4. Slide the seat assembly towards the cabinet while guiding the wire harnesses inside. Attach the seat assembly to the seat runners using four (4) 2-1/4" T-27 Torx screws with 1/4" lock washers and fender washers.

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Seat Assembly Installation (Mini-Motion Cabinet)

Figure 5. Display and Mini-Motion Sections Secured Together

1. Place the two cabinets near each other and connect the harness connectors between the Display Cabinet and seat assembly:
   - Mini-Motion Systems: Six connections
   - Deluxe Systems: Three connections
2. Slide the seat assembly towards the cabinet while guiding the wire harnesses inside. Place the connecting brackets as shown in Figure 5 and secure with the eight (8) bolts and flat washers.

Power On and Test

1. Power the cabinet on. For Mini-Motion systems, turn on **both** power switches on the power plate on the back of the display cabinet. (There are separate power switches for the Display Cabinet and Motion Base). If a Found New Hardware Wizard appears onscreen, power cycle the game. Play a game to verify proper operation.
2. Press the **Test** button inside the coin door to open the Operator Menu, and select **Diagnostics** to test controls, audio, and motion if applicable.
3. Use the Operator Menus to set up audio volume, pricing, and other Operator Settings. See Chapter 3 for details on using the Operator Menus.

Linking Cabinets

You can link up to four cabinets for head-to-head competition. Once the cabinets are linked in hardware and software, the Attract Movies will synchronize, and players can choose to play individually or race against other players. Motion and Non-Motion Cabinets can be linked together if desired.

Two cabinets can be linked directly, without a cross-over coupler. If you use a cross-over coupler to link two cabinets, it must be Gigabit compliant. To link three or four cabinets, connect the Ethernet cable from each cabinet to a Gigabit-compliant Ethernet hub or switch (not included).

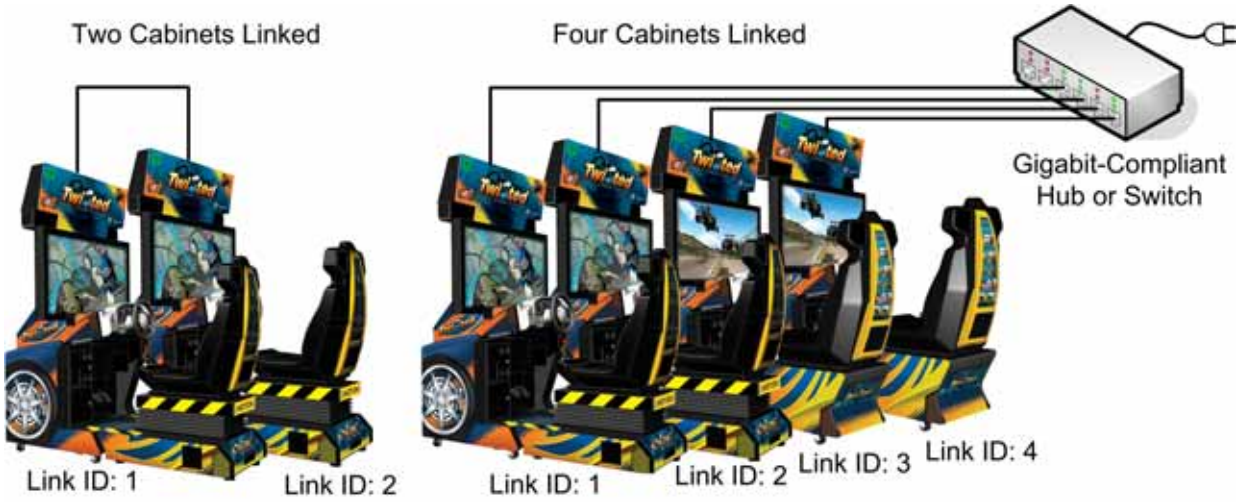

Figure 6. Linking Cabinets

Follow the steps below to link your cabinets:

1. **Before connecting the Ethernet cables** open the Operator Menu **Machine Settings: Settings** menu on each cabinet and set the Link ID number. Cabinets should be numbered in sequence from left to right, and each cabinet must have a unique number: 1, 2, 3, or 4. Exit from the Operator Menu to reset the number in the software.

   Important: All linked cabinets must run the same **Software Comm Version**, displayed in the Operator Menu **Machine Info** screen.

   - **To link two cabinets:** Connect one Ethernet cable to the Ethernet port on the power plate of both cabinets.
   - **To link three or four cabinets:** Connect an Ethernet cable from the Ethernet port on the power plate of each cabinet to an Ethernet hub or switch (not included). The hub or switch must support 10/100/1000 Mbps (Gigabit) connection speed. Connect the Hub or Switch to AC power. **DO NOT use a cross-over coupler with a hub or switch**.

Linking Errors

Each cabinet must have a unique Cabinet Link ID number. If the software detects a duplicate Link ID number, the *Select A Link ID* screen, shown below, will automatically appear and prompt you to change the number. Numbers shown in a gray cabinet image are available. Turn the wheel to select a number and then press the **START** button.

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Cabinet Mismatch Errors

Make sure the Game Settings and Coin Settings are the same for all linked cabinets. You will have unhappy customers if a setting such as *Winner Gets Free Game* is enabled on some cabinets and disabled on others. If the settings listed below are mismatched on linked cabinets, a Blue Dot will appear in the Attract Mode, and you will see an explanation of the problem in the **Machine Settings: Errors** screen.

- Software Comm Version
- Free Game Min Players
- Winner gets Free Game
- Disabled Tracks

Cabinet Linking Troubleshooting

The issues below can prevent cabinets from linking properly.

Cause	Possible Solution
Faulty wiring	Verify that a CAT-5 (8-wire) Ethernet cable is connected between the Ethernet port on the AC Power Plate and the computer. While the cabinet is powered on and connected to another cabinet, verify the green LED on the Ethernet card is lit. If you are using an Ethernet hub or switch, verify green LEDs on the hub or switch light for each Ethernet port that is connected.
Cross-over coupler not used or used improperly	To link two cabinets, connect an Ethernet cable to the Ethernet port on the power plate of each cabinet. If you use a cross-over coupler make sure it is Gigabit compliant. **Do not** use a cross-over coupler with a hub or switch.
Cross-over coupler is not Gigabit compliant	All components used to link cabinets must be Gigabit (10/100/1000 Mbps) compliant. Couplers shipped with older cabinets are not Gigabit compliant.
Faulty Ethernet hub or switch	Verify the LEDs on the Ethernet hub or switch are lit for each port used. If possible, verify the hub or switch is working by connecting it to a known working computer network or set of linked cabinets.
Hub or switch is not 10/100/1000 Mbps	A 10/100/1000 Mbps (Gigabit) hub or switch is required to link three or four cabinets.
Duplicate Link ID numbers	A cabinet with a duplicate Link ID number will display the *Select A Link ID* menu. You can also check or change the Link ID from the Operator menu **Machine Settings: Settings** screen. Each cabinet in a linked group must have a unique Link ID number.
Mixed Software Comm Versions	Verify that all cabinets are running the same Comm Version, shown in **Machine Settings: Info** screen. If Comm Versions are different, re-install software as needed (see page 36) so that all games are running the same software version.

Checking the Game Dongle

Note: Motion and non-motion cabinets require different dongles.

The cabinet uses a Game Dongle to activate the game software. If the dongle is missing, the game will not run. When a USB Game Dongle is installed and working properly, a **red** LED will illuminate inside the dongle.

For a Game Dongle to be recognized correctly, it should be connected before the cabinet is powered ON. If the software does not recognize the Game Dongle, the **Dongle Missing or Invalid** screen will appear. Make sure the Dongle is connected properly, and then power cycle the cabinet.

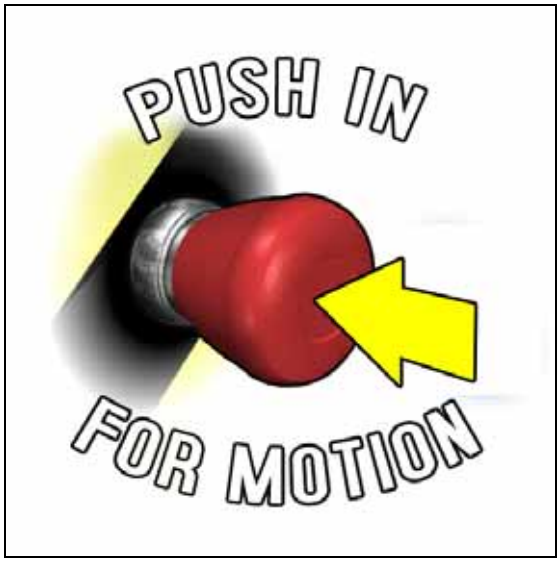
Note: The dongle supplied with the cabinet is specific to the game software version. Future software upgrades may require a new dongle. If the dongle does not match the software, the **Dongle Missing or Invalid** screen will appear.

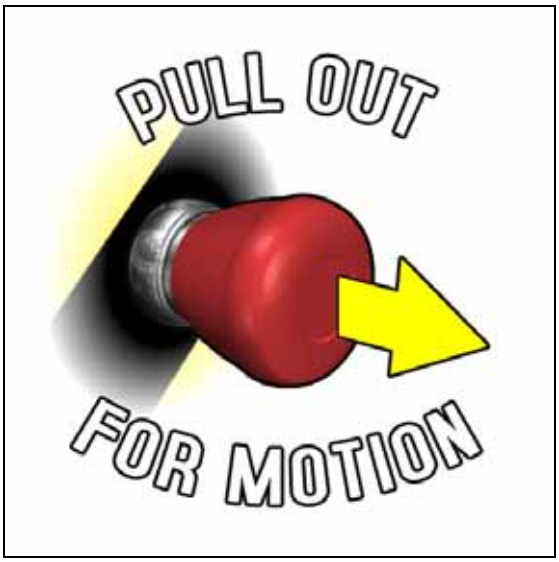
Important: Some of your cabinet information is stored in the dongle, so if you replace your computer, **remove the dongle and keep it with the cabinet**.

Figure 7. USB Game Dongle

Mini-Motion Base Overload Protection

If the Mini-Motion Base is overloaded by players exceeding the weight limit or standing on the back of the platform, it may enter a fault state to prevent damaging the motor and electronics. If this happens, the graphic shown below on the left will appear during gameplay, telling the player to push in the Motion STOP Button. The graphic on the right will then appear to tell the player to pull the button out again.





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Maintenance Restart Feature

To keep the software running optimally, the cabinet will restart itself every 24 hours. The automatic restart will not occur if the operator turns the cabinet off every day. The maintenance restart occurs according to the following conditions:

1. If the game has been running continuously for at least 24 hours,
   and the game has been in Attract Mode (not played) for at least 15 minutes,
   then the following screen will be displayed:

2. The screen will count down for 30 seconds.

   If a user presses the **START** button, the screen will not appear again until the next time the Attract Mode has been running for 15 minutes.

   If nobody presses the **START** button, the game will shut down and restart, which will take about 3 minutes.

3. After the cabinet completes the Restart, the next Restart will be scheduled for 24 hours later. If the initial Restart happens to be scheduled during a busy time for your location, the action of players pressing **START** to postpone will move the restart to a time that is not busy.

Hint: To force the restart to happen at a certain time (such as after closing time), power cycle the cabinet at that time. The next restart will be scheduled for 24 hours later.

To see how much time is left before the next maintenance restart, check the **Machine Settings: Info** screen in the Operator Menu (see Chapter 3 for detailed information on using the Operator Menus). This screen also tells you how much time has passed since the last power cycle and the last maintenance restart.

Chapter 2 — Driving a Race

1. Insert coins and press the **START** button.
2. The Select Track screen will appear first. Turn the wheel to highlight a track. Tracks are rated *Normal*, *Medium*, or *Hard*. Press the gas pedal to select the highlighted track.

3. The Select Car screen will appear next. Turn the wheel to highlight a car, and press the gas pedal to select.

4. If you are on a linked cabinet, the Waiting for Drivers Lobby screen will appear. Otherwise, the game will start to load, and hint screens will appear while the game loads.

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Linked Racing: Once you coin up and press **START**, all other linked cabinets in Attract Mode will display the "Join Now" screen. Players who coin up and press **START** will automatically join the race, and skip the Select Track screen. (To race solo, wait for the race to begin before pressing **START**.)

Driving Controls

As in any driving game, use the Steering Wheel, Gas, and Brake to control the car. Additional controls are described below:

- The **LOOK BACK** button lets you look behind the car.
- The **VIEW** button toggles the view between inside and outside the car.
- Tap the ♪ button to turn the music off; tap it again to change songs.
- Press the **BOOST** button for an extra burst of speed.

The Race Screen

During the race, useful information is displayed onscreen, as described below. Additional hint screens may appear during the race to tell you about controls you have not used.

1. Shows the time you have to reach the next checkpoint.
2. Shows your current position.
3. Shows your speed in either km/h or MPH (set in the Game Operator menu).
4. Shows your engine speed in thousand RPMs.
5. Shows the amount of Boost you have. (Boost supply is endless.)
6. Shows the current lap and total laps in the race.
7. Shows the time since the start of the race.
8. Shows a track map. Driving direction is indicated by the yellow arrow above the map. Your car is shown by a yellow dot. Other cars are shown by green dots.

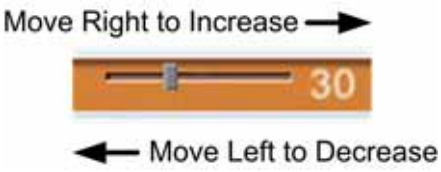
At the end of the race, each driver's time and position is displayed.

Chapter 3 — Operator Menu and Game Setup

This chapter describes how to use the Game Operator menu to set up the game, diagnose problems, and view gameplay and earnings statistics.

Navigating the Operator Menu

1. With the game running in Attract Mode, open the coin door to locate the Operator Button Panel. Press the **TEST/BACK** button to open the menus.
2. Once you enter the Operator Menu, use the **VIEW** and ♪ buttons to move up and down through the main menu list on the left side of the screen. Pause over a menu item to open the submenu below it, and then use the **VIEW** and ♪ buttons to move through the submenu items.
3. When you move over a submenu item, a blue highlight will appear around the item. Press the **START** button to open the associated menu or screen.
4. Once you open a menu, use the **VIEW** and ♪ buttons to navigate through the menu items. Press **START** to select an item and change its setting
5. Some menu items use sliders to set numeric values. A slider, as shown below, will appear when you highlight the item and press **START**. To set the slider, press the **VIEW** and ♪ buttons to increase or decrease the value, and then press **START** again to save the selected value.



6. Some items use popup menus to select settings, as shown below. The popup menu will appear when you highlight the item and press **START**. Press the **VIEW** and ♪ buttons to select from the popup menu, and then press **START** again to save the selected value.

7. When you finish with a menu, press the **LOOK BACK** button to return to the main menu list on the left side of the screen.
8. To exit from the Operator Menu, highlight **Resume Game** at the bottom of the menu list (press **LOOK BACK** to instantly highlight **Resume Game**) and press **START**.

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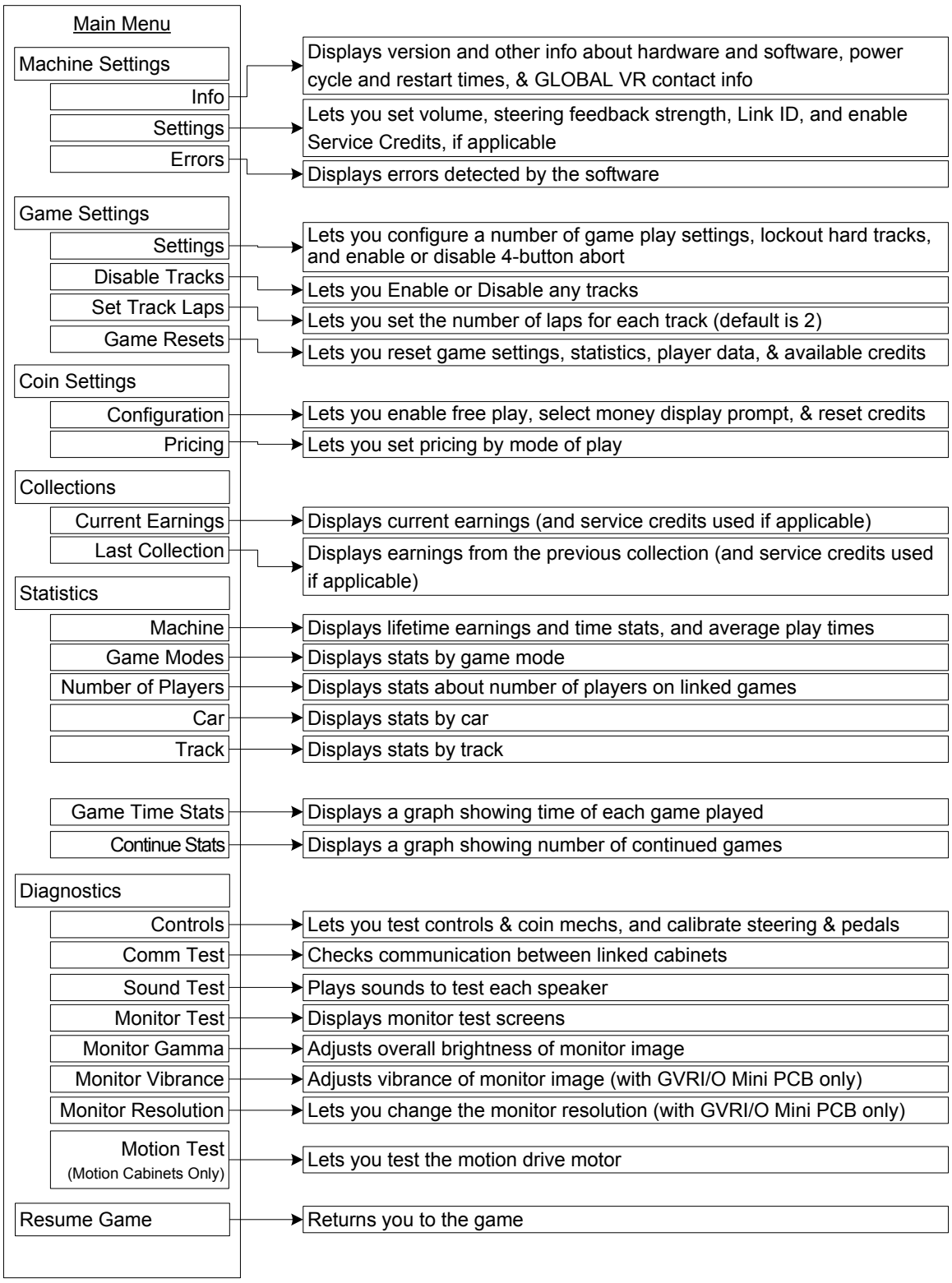
Main Menu
Machine Settings
Info
Displays version and other info about hardware and software, power cycle and restart times, & GLOBAL VR contact info
Settings
Lets you set volume, steering feedback strength, Link ID, and enable Service Credits, if applicable
Errors
Displays errors detected by the software
Game Settings
Settings
Lets you configure a number of game play settings, lockout hard tracks, and enable or disable 4-button abort
Disable Tracks
Lets you Enable or Disable any tracks
Set Track Laps
Lets you set the number of laps for each track (default is 2)
Game Resets
Lets you reset game settings, statistics, player data, & available credits
Coin Settings
Configuration
Lets you enable free play, select money display prompt, & reset credits
Pricing
Lets you set pricing by mode of play
Collections
Current Earnings
Displays current earnings (and service credits used if applicable)
Last Collection
Displays earnings from the previous collection (and service credits used if applicable)
Statistics
Machine
Displays lifetime earnings and time stats, and average play times
Game Modes
Displays stats by game mode
Number of Players
Displays stats about number of players on linked games
Car
Displays stats by car
Track
Displays stats by track
Game Time Stats
Displays a graph showing time of each game played
Continue Stats
Displays a graph showing number of continued games
Diagnostics
Controls
Lets you test controls & coin mechs, and calibrate steering & pedals
Comm Test
Checks communication between linked cabinets
Sound Test
Plays sounds to test each speaker
Monitor Test
Displays monitor test screens
Monitor Gamma
Adjusts overall brightness of monitor image
Monitor Vibrance
Adjusts vibrance of monitor image (with GVRI/O Mini PCB only)
Monitor Resolution
Lets you change the monitor resolution (with GVRI/O Mini PCB only)
Motion Test
(Motion Cabinets Only)
Lets you test the motion drive motor
Resume Game
Returns you to the game

Figure 8. Operator Menu Flowchart

Notes: The **current date and time** are displayed on each menu screen. You can change the date and time in the BIOS Settings (see page 63). The date and time only appear on Operator Menu screens and do not affect gameplay.

Machine Settings: Info Screen

This screen is displayed first when you press the **TEST/BACK** Button. It displays important information about the cabinet, and contact information for GLOBAL VR.

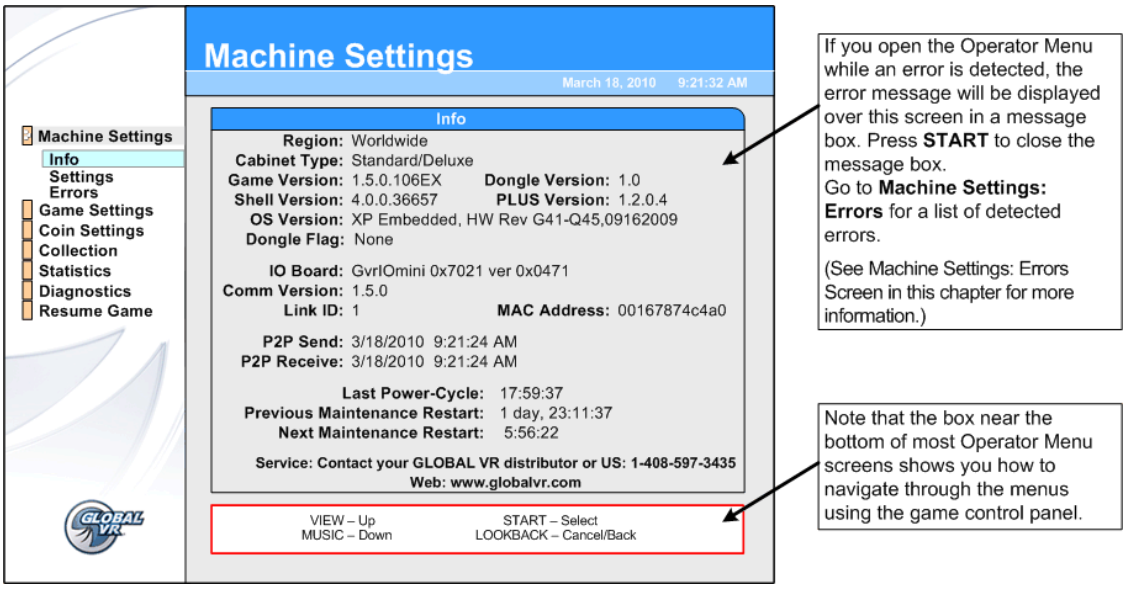
Machine Settings
March 18, 2010 9:21:32 AM
Machine Settings
Info
Settings
Errors
Game Settings
Coin Settings
Collection
Statistics
Diagnostics
Resume Game
Info
Region: Worldwide
Cabinet Type: Standard/Deluxe
Game Version: 1.5.0.106EX
Dongle Version: 1.0
Shell Version: 4.0.0.36657
PLUS Version: 1.2.0.4
OS Version: XP Embedded, HW Rev G41-Q45,09162009
Dongle Flag: None
IO Board: GvrIOmini 0x7021 ver 0x0471
Comm Version: 1.5.0
Link ID: 1
MAC Address: 00167874c4a0
P2P Send: 3/18/2010 9:21:24 AM
P2P Receive: 3/18/2010 9:21:24 AM
Last Power-Cycle: 17:59:37
Previous Maintenance Restart: 1 day, 23:11:37
Next Maintenance Restart: 5:56:22
Service: Contact your GLOBAL VR distributor or US: 1-408-597-3435
Web: www.globalvr.com
VIEW – Up
MUSIC – Down
START – Select
LOOKBACK – Cancel/Back
If you open the Operator Menu while an error is detected, the error message will be displayed over this screen in a message box. Press START to close the message box.
Go to Machine Settings: Errors for a list of detected errors.
(See Machine Settings: Errors Screen in this chapter for more information.)
Note that the box near the bottom of most Operator Menu screens shows you how to navigate through the menus using the game control panel.

Figure 9. Machine Info Screen

Menu Item	Description
Region	Displays the region or country of operation.
Cabinet Type	Displays the cabinet type as set by the Game Dongle (*Standard/Deluxe* or *Mini-Motion*).
Game Version	Displays the installed software game version.
Shell Version	Displays the software shell version.
OS Version	Displays the operating system version.
Dongle Flag	In some regions *Winner Gets Free Game* is not allowed. In these areas the dongle flag will be set to *Free Game Option Disabled*, and that option will not appear on the Game Settings: Settings menu.
Dongle Version	Displays the localized version of the software, as read from the Game Dongle.
PLUS Version	Displays the PLUS data engine version.
IO Board	Displays the version of the GVRI/O Mini PCB Installed.
Comm Version	Displays the communication software version. (Linked cabinets must run the same version.)
Link ID	Displays the Cabinet Link ID number.
MAC Address	Displays the MAC address of the system computer. This number may be useful to Tech Support for troubleshooting certain cabinet linking problems.
P2P Send	Displays the last time player data was sent to other linked cabinets.
P2P Receive	Displays the last time player data was received from other linked cabinets.
Last Power-Cycle	Displays the amount of time since the cabinet was last powered on.
Previous Maintenance Restart	Displays the amount of time since the cabinet did an automatic maintenance restart.
Next Maintenance Restart	Displays the amount of time until the cabinet does an automatic maintenance restart.

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Machine Settings: Settings Menu

This menu lets you set up audio, Service Credit Switch (if applicable), steering feedback strength, and Link IDs. It also displays available Service and Paid Credits.

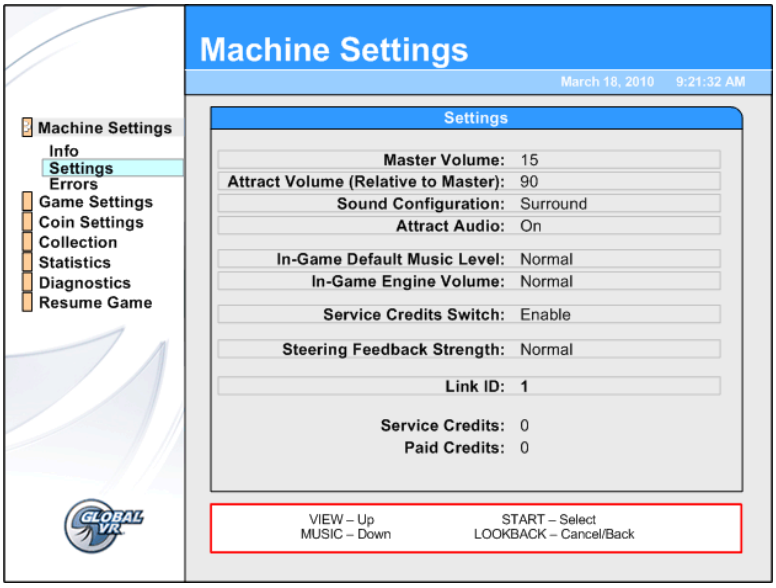

Figure 10. Machine Settings Menu

Menu Item	Description
Master Volume	Sets the overall cabinet volume from 0—100.
Attract Volume (Relative to Master)	Sets the Attract Mode volume from 0%—100% of Master Volume.
Sound Configuration	Sets sound configuration to Surround (for sit-down cabinets) or Stereo (for upright cabinets with no seat or rear speakers).
Attract Audio	Sets how often the Attract Mode sound plays. Options are *On*, *Sometimes (1/3)*, or *Off*. The *Sometimes 1/3* setting plays Attract Audio 1/3 of the time.
In-Game Default Music Level	Sets the music volume during the game. Options are Off, Soft, Normal or Loud.
In-Game Engine Volume	Sets car engine volume during the game. Options are Soft, Normal or Loud.
Service Credits Switch	If set to *Enable*, lets you add Service Credits by pressing the **SERVICE** button on the Operator Button Panel during Attract Mode. Service Credits can be used for testing gameplay, and are counted separately from Paid Credits in the collection statistics screens.
Steering Feedback Strength	Sets how strong the Steering Force Feedback feels. Options are *Normal* or *Light*.
Motion Platform Strength (Motion Cabinets Only)	Sets how strong the Motion feels. Options are *Light* and *Normal*.
Link ID	Select this item and press **START** to open the *Select a Link ID* screen. (See pages 10 11 for details on setting Link IDs).
Service Credits	Shows how many Service Credits are currently available. *Service Credits Switch* must be set to *Enable* in this menu to add Service Credits with the Operator **SERVICE** button.
Paid Credits	Shows how many Paid Credits are currently available on the cabinet.

Machine Settings: Errors Screen

The Errors screen displays errors detected by the system software. Some errors cause a message to be displayed at boot. Non-critical boot error messages such as "There is a CD in the Drive" will time-out after 30 seconds. Critical errors, such as *Dongle Missing or Invalid*, will prevent the game from booting.

If you open the Operator Menu while an error is detected, a message box will appear with the error message. Press **START** to close the message box. Open the Errors Screen for a list of any detected errors.

Error Messages

This table lists error messages that you may see at boot or on the Errors screen.

Error Message	**Explanation and Solution**
No Dongle	Make sure the USB Game Dongle is firmly connected. Try a different USB port if the dongle is not detected after a reboot.
Invalid Dongle: Incorrect Game Version	Dongle does not match game version. If you upgrade the software, be sure to connect the corresponding Game Dongle.
There is a CD in the Drive	Eject the disk from the drive. Press the **START** button to continue to boot the game if you see this message at boot.
Error Detected with GVRIO Board	The GVRI/O Mini PCB is either disconnected or malfunctioning. Check all connections to the PCB. Replace the PCB if faulty.
Incorrect GVRIO Board	The screen will display the revision numbers of the GVRI/O Mini PCB installed, and the one required. Contact your distributor to order the correct GVRI/O Mini PCB.
Select a Link ID (Screen appears if a duplicate Link ID is detected)	The cabinet has the same Link ID as another cabinet. Turn the wheel to select a different Link ID from the screen and press **START**. Number the cabinets in sequence from left to right.
Steering Auto Calibration failed. Please turn the wheel all he way to the left and all the way to the right	The software detected a problem with steering. Once you turn the wheel, the software will determine whether the problem is with the steering pot or the force-feedback. If the problem is with the force feedback, you will be given the option to start the system without force feedback. If the steering pot is not working, the game cannot be started. See page 40 for steering service procedures.
Motion Hardware Not Found	The software is not detecting the Motion PCB. Check all cables to the Electronics Box in the Mini-Motion base. If this message appears on a non-motion cabinet it probably has a Motion Dongle installed. Make sure the correct Cabinet Type is displayed on the Machine Info screen.
Error Detected with Motion System	The Motion PCB is returning an error code. Contact Technical Support.
Attract Mode Error Messages	**Explanation and Solution**
A **Red Dot** appears in the lower right corner of the Attract Screen	Indicates a hardware error, usually with a button, gas or brake pot, or steering. An explanation is displayed in the Errors screen.
A **Blue Dot** appears in the lower right corner of the Attract Screen	Indicates a Cabinet Mismatch in linked cabinets. An explanation is displayed in the Errors screen. The following conditions will cause a Blue Dot error message: • *Winner Gets Free Game* not set the same on all cabinets • *Free Game Min Players* not set the same on all cabinets • Different Software Comm Version on one or more cabinets • Different Tracks Disabled on one or more cabinets

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Game Settings: Settings Menu

This menu lets you set up game-play options.

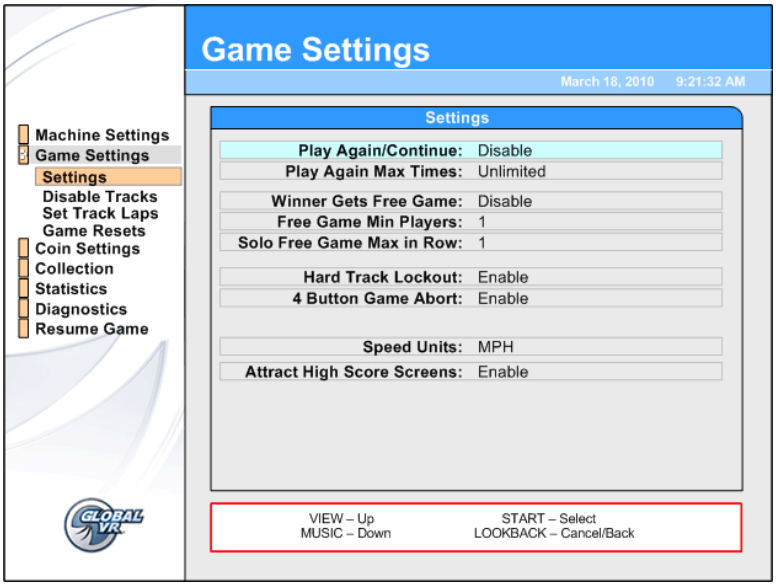


Figure 11. Game Settings Menu

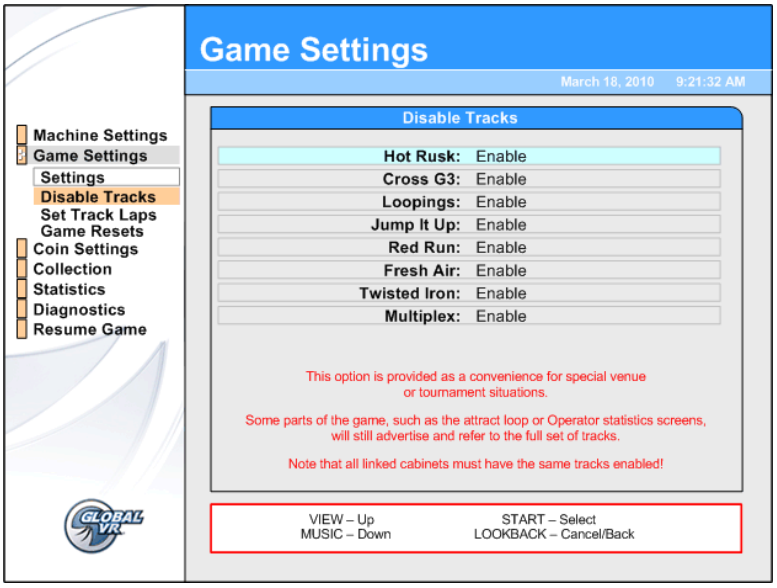
Menu Item	Description
Play Again/Continue	If set to *Enable*, allows you to set different pricing to start playing or continue (play again). Set the pricing from **Coin Settings: Pricing**.
Play Again Max Times	Lets you set the maximum number of times a player can use *Continue*. Options are *1*, *2*, or *Unlimited*.
Winner Gets Free Game*	If set to *Enable*, the winner of a race gets a free game.
Free Game Min Players*	If Winner Gets Free Game is enabled, this sets the minimum number of players required for the free game to be awarded. Options are *1—4*.
Solo Free Game Max in Row*	If Winner Gets Free Game is enabled, and Free Game Min Players is set to *1*, this sets the maximum number of times in a row the free game can be awarded. Options are *1—3 Times*.
Hard Track Lockout	If set to Enable, players must press the ♪ button to unlock a hard track before selecting it. This prevents players from accidently selecting a hard track.
4 Button Game Abort	If set to *Enable*, a solo race can be aborted by pressing the **VIEW**, ♪, **LOOK BACK** and **START** buttons at the same time.
Speed Units	Sets speed units to display in *MPH* or *km/h*.
Attract High Score Screens	Sets whether to display high scores during Attract Mode.

* Free Game settings may be unavailable in some areas due to local regulations.

Game Settings: Disable Tracks Menu

This screen allows you to disable or enable any tracks. Disabled tracks do not show up in the Select Track screen.

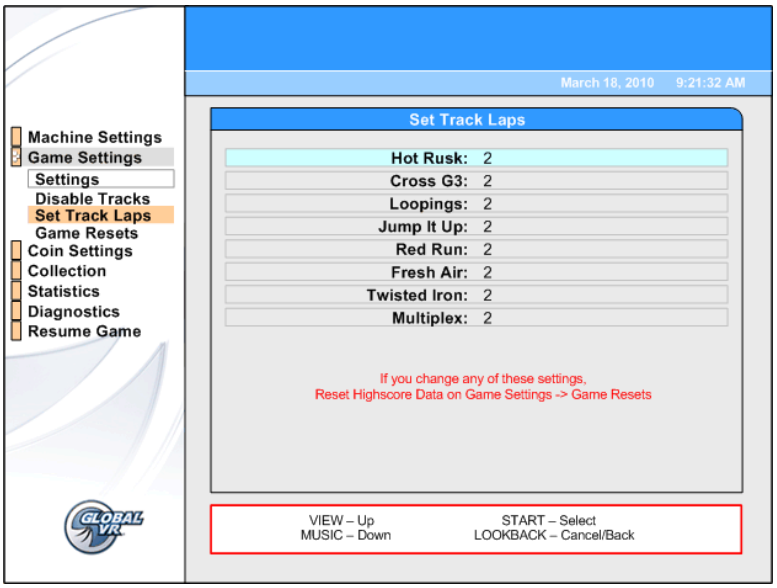
Note: If linked cabinets do not have the same tracks available, a blue dot will appear in the lower right corner of the Attract screen on each cabinet, to indicate a Cabinet Mismatch.



Game Settings: Set Track Laps Menu

This menu lets you set the number of laps for each track (the default number is 2).

Note: If you change the number of laps for any track(s), go to the **Game Settings: Game Resets** menu and select **Reset Highscore Data** to avoid displaying scores from games of different lengths on the same screen.



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Game Settings: Game Resets Menu

This menu lets you restore factory default settings, or reset cabinet statistics, standings, or available credits. When you select any reset button except Reset Credits, a confirmation box will appear, allowing you to accept or cancel your reset selection.

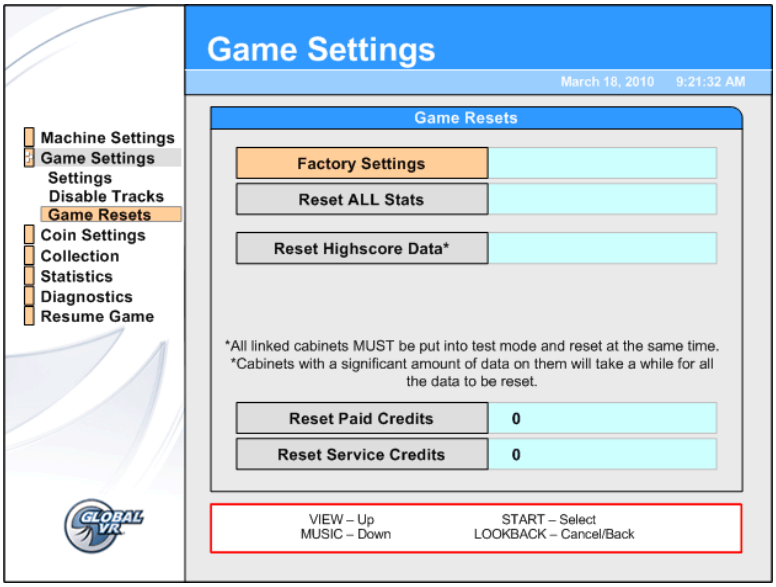

Figure 12. Game Resets Menu

Menu Item	Description
Factory Settings	Returns all the Game settings to the default factory settings. Does not affect records and statistics.
Reset ALL Stats	Resets all gameplay Statistics. Does not affect the Lifetime Totals.
Reset Highscore Data	Clears High Score data stored in the computer. A confirmation prompt will appear after you select **Important:** To reset data on linked cabinets you **must** either disconnect the Ethernet cables or enter the Operator menu on *all* of the cabinets and then reset them all. If you reset data on a single linked cabinet, the data will almost instantly be repopulated from the other cabinets once you return to Attract Mode.
Reset Paid Credits	Resets available Paid Credits to 0. Does not affect Service Credits. The number next to the button shows available Paid Credits. Any Paid Credits displayed when you reset are counted as Unspent Monies in the **Collections** screens.
Reset Service Credits	Resets available Service Credits to 0. Does not affect Paid Credits. The number next to the button shows available Service Credits.

Coin Settings: Configuration Menu

This menu lets you turn free play on or off, select the Money Display Prompt, and reset credits.

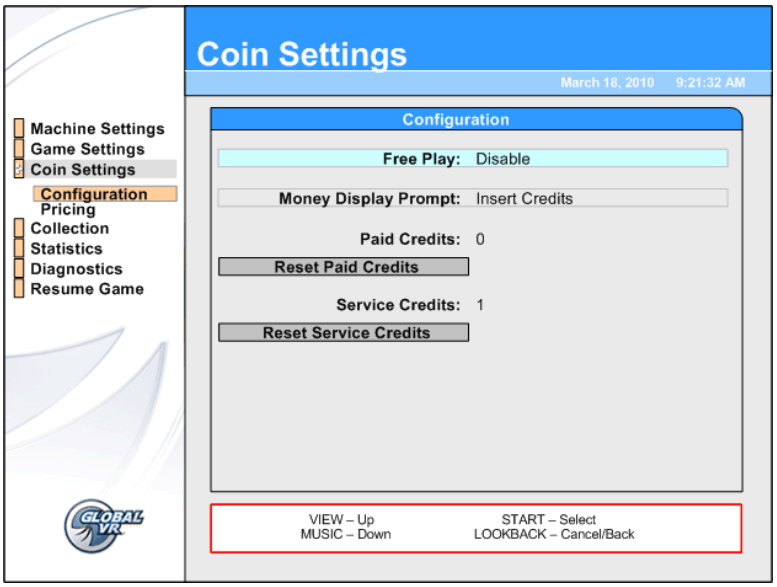

Figure 13. Coin Settings: Configuration Menu

Menu Item	Description
Free Play	Sets Free Play to *Enable* or *Disable*.
Money Display Prompt	Sets the Money Display Prompt to *Insert Coins*, *Insert Credits*, *Insert Bills*, *Insert Tokens*, *Insert Money*, or *Swipe Card*.
Paid Credits	Displays the number of paid credits currently available.
Reset Paid Credits	Resets available Paid Credits To 0. Does not affect Service Credits. The number next to the button shows available credits. Any Paid Credits displayed when you reset are counted as Unspent Monies in the **Collections** screens. (There is no confirmation prompt.)
Service Credits	Displays the number of Service Credits currently available.
Reset Service Credits	Resets available Service Credits to 0. (There is no confirmation prompt.)

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Coin Settings: Pricing Menu

This menu lets you set the number of credits required to start or continue a game.

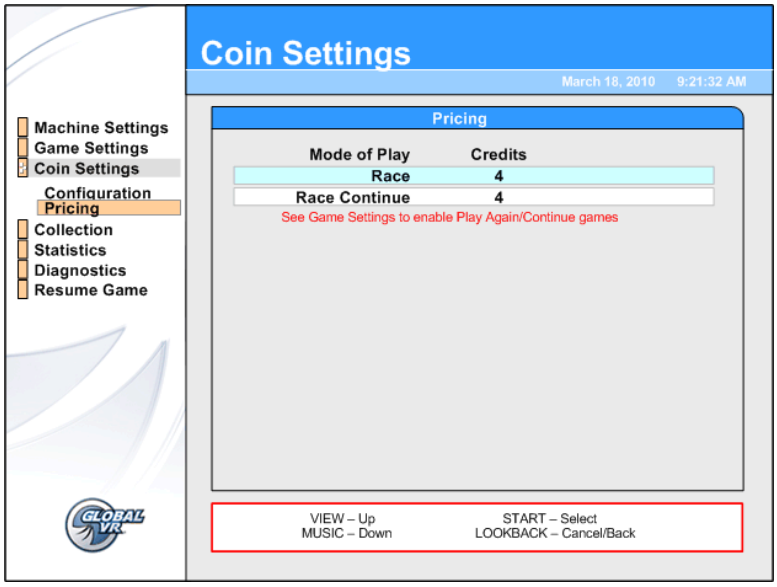

Figure 14. Coin Setting: Pricing Menu

Menu Item	Default	Description
Race	4	Lets you set the number of credits required to start a new game. Options are *1—50*.
Race Continue	4	Lets you set the number of credits required to continue a game (play again). Options are *1—50*. *Play Again/Continue* must be set to *Enable* in the **Game Settings: Settings** menu to use this feature.

Collections Screens

The **Current Earnings** screen displays Earnings and Service Credits for the current period. Earnings are displayed in Credits only.

When you select **Reset Bookkeeping**, and then confirm in the confirmation box that appears, all amounts are reset to zero (0) in the Current Earnings screen, and the data is moved to the **Last Collection** screen.

Lifetime Earnings and Lifetime Average Weekly Earnings are displayed on the **Statistics: Machine** screen described on page 28.

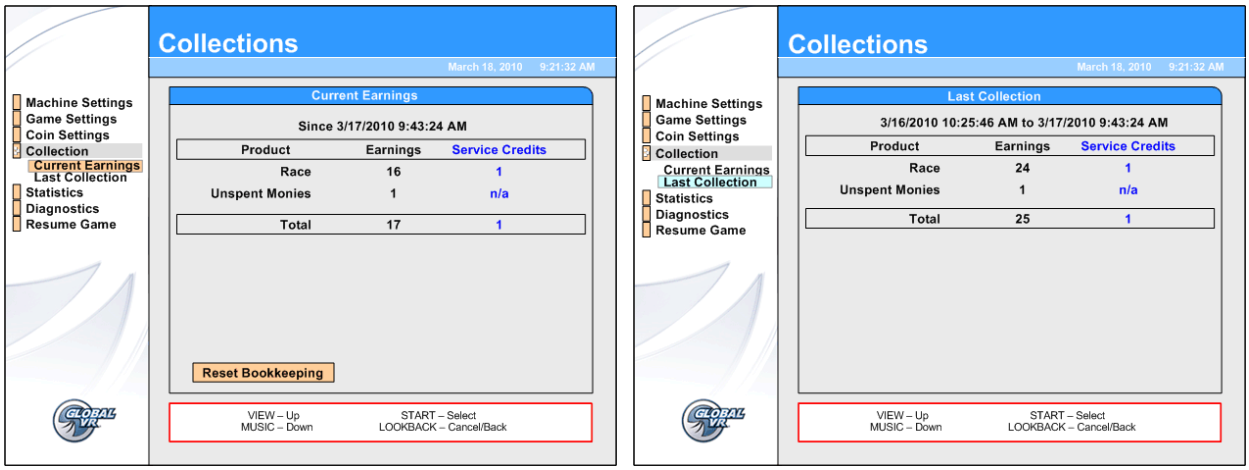

Figure 15. Collections Screens

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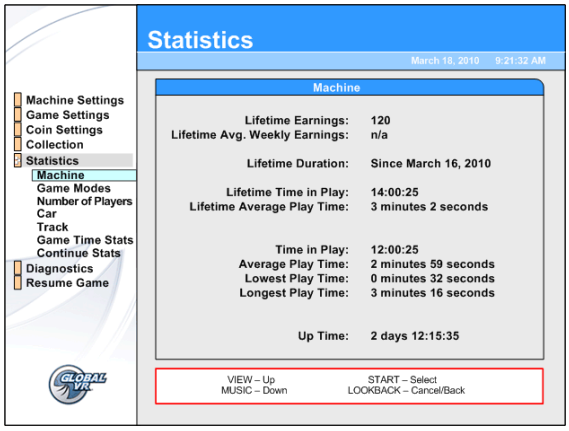
Statistics Screens

The Statistics screens allow the operator to view the gameplay statistics collected by the cabinet. The lifetime totals are never reset unless the operating system is restored using the System Recovery Disk. To reset the current Total for any screen, use the **Game Settings: Game Resets** menu described on page 22.



Statistics: Machine displays general statistics about the cabinet.

Lifetime Earnings — total earnings for cabinet.

Lifetime Avg. Weekly Earnings — earnings per week averaged over cabinet lifetime.

Lifetime Duration — the date the operating system was installed. This is updated if you run the System Recovery Disk.

Lifetime Time in Play — total time the cabinet has spent being played.

Lifetime Average Play Time — lifetime average length of a game.

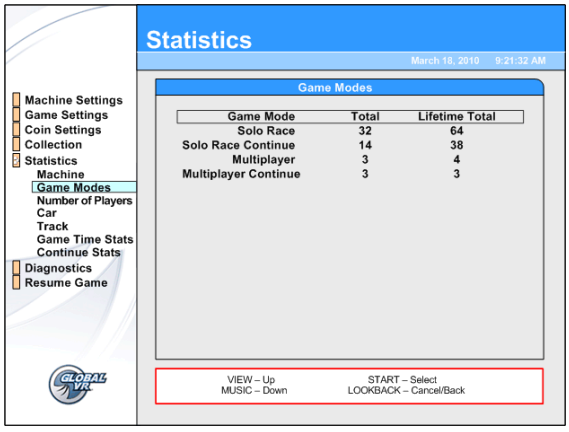
Time in Play — total time the cabinet has spent being played since the last reset.

Average Play Time — average length of a game since the last reset.

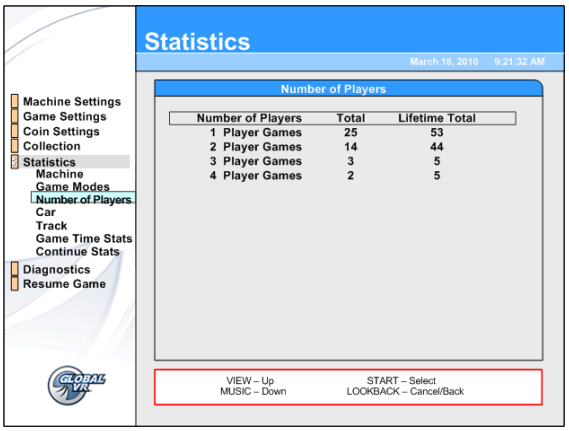
Lowest Play Time — shortest game ever played since the last reset.

Longest Play Time — longest game ever played since the last reset.

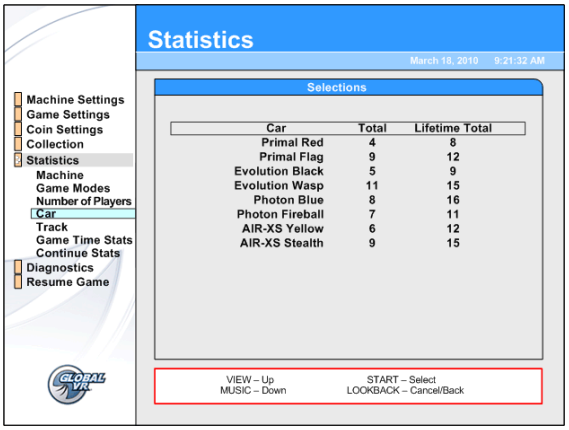
Up Time — total time the cabinet has been turned on since the last reset.



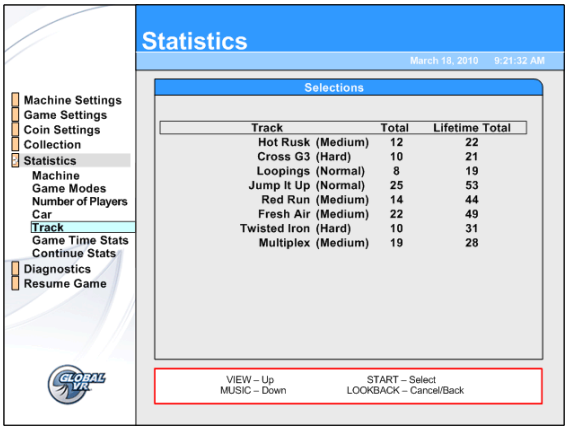
Statistics: Game Modes displays the total number of Solo and Multiplayer (linked cabinet) games played and continued. Shows Total for the current period, and Lifetime Total.



Statistics: Number of Players displays the number of multi-player games played on linked cabinets by the number of players per game. Shows Total for the current period, and Lifetime Total.



Statistics: Car displays the number of games played using each car for the current period, and Lifetime Total.



Statistics: Track displays the number of games played using each track for the current period, and Lifetime Total.

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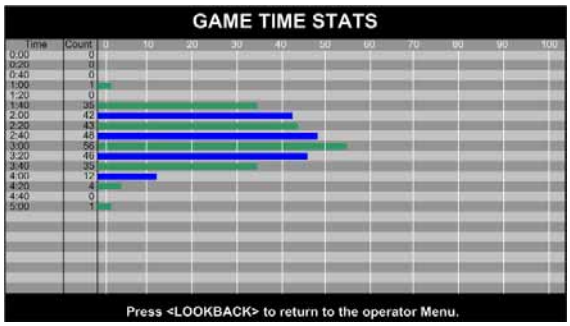
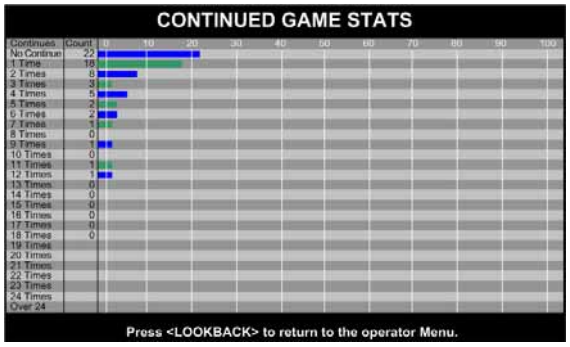


Statistics: Game Time Stats displays a graph showing how long the games last. For example, in the graph at the left, 42 games lasted over 2 minutes, but less than 2 minutes and 20 seconds. Only 1 game lasted less than 1 minute and 20 seconds.

Press the **LOOK BACK** button to exit this screen.



Statistics: Continued Game Stats displays a graph showing how many times players Continued after a game ended. For example, in the graph at the left, 18 players continued once, and 8 players continued twice.

Press the **LOOK BACK** button to exit this screen.

Diagnostics: Play Control Test

The Play Control Test menu lets you test driving controls, operator buttons, and coin mechs, as described below. To exit from this menu, press the **START** and **VIEW** buttons together. If you see a ⃠ symbol displayed over a pedal or the wheel, it was not detected by the software and may be disconnected. Try turning the wheel full left and right, or pressing the pedal full down and releasing. See page 40 for steering system service, and page 43 for pedal service information.

- **Buttons**: When you press a control panel or Operator button, its picture should highlight on the screen. The dot next to each button should be yellow until the button is pressed, and stay green after it is pressed. A red dot means the button is stuck in the ON position.
- **Steering Wheel**: When you turn the steering wheel, the graphic should rotate, and the number next to the graphic should change to indicate the steering wheel position. Full left position should be about *-127* and full right position should be about *127*. As you turn the wheel, the changing numbers should be smooth and linear. A sudden jump in the number, or a different range of numbers, can indicate a bad pot or a loose steering column set screw. The dot under the number should change from yellow to green when you turn the wheel.
- **Gas & Brake Pedal**: The numbers displayed next to the pedals show the pot value when the pedal is full up, full down, and the current value. If the number on top is 0 or the number on the bottom is 255, there may be a problem with the pot or wiring (see page 43 for service information). When you step on the pedals, the number shown for the current position should change. The difference between the full up and full down values should be about 80 (±5). As you press and release the pedals, the changing numbers should be smooth and linear. A sudden jump in the numbers can indicate a bad pot or a loose set screw on the pedal assembly. The dot above the pedal should change from yellow to green when you press the pedal.
- **Calibrating the Steering and Pedals**: To calibrate the steering wheel and pedals, press the **START** and ♪ buttons together to reset the pots to 0. A ⃠ symbol will appear over the pictures of the pedals and wheel. Turn the steering wheel all the way to the left and the right to set the pot limits. Press each pedal all the way down to set the pot limits.

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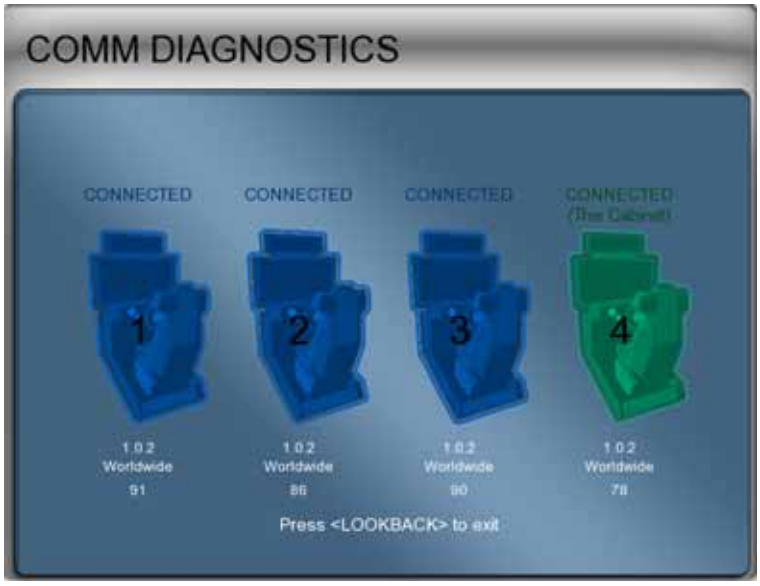
- **Coin Mechs**: When you activate a coin mech, its name (Coin 1 or Coin 2) should turn from white to green, and the number should increment to indicate the number of credits inserted. If the name of the mech stays green, this indicates it is stuck in the ON position. (**Note:** Typically, Coin 1 is both coin mechs, and Coin 2 is the optional bill validator.)
- **START Button and Leader Light**: The **START** button and Leader Light should blink while the **Play Control Test** menu is open. If either one fails to blink, check the bulb and wiring.

Diagnostics: Comm Test

This screen shows the status of all linked cabinets, as well as their Comm version and region. The number under the region indicates data transfer. If a cabinet is communicating properly this number will increment continuously while the screen is open.



Diagnostics: Sound Test

This screen tests the speakers and subwoofer.

Once you enter the sound test, each speaker will play a sound while the graphic indicates the speaker that should be playing, and the onscreen text displays the name of the speaker. The screen on the left is displayed on sit-down cabinets with surround sound. The screen on the right is displayed on upright cabinets with no seat or rear speakers once you change the Sound Configuration to Stereo in the **Machine Settings: Settings** menu.

Press the ♪ button at any time to pause or resume the test. The test will repeat until you press the **LOOK BACK** button to exit.

If any sound comes from the wrong speaker, or any speakers are not working, check the connections to the speakers, audio amp, and PC. Please see Audio Amp and Speakers Service on page 47 for more information on fixing audio problems.

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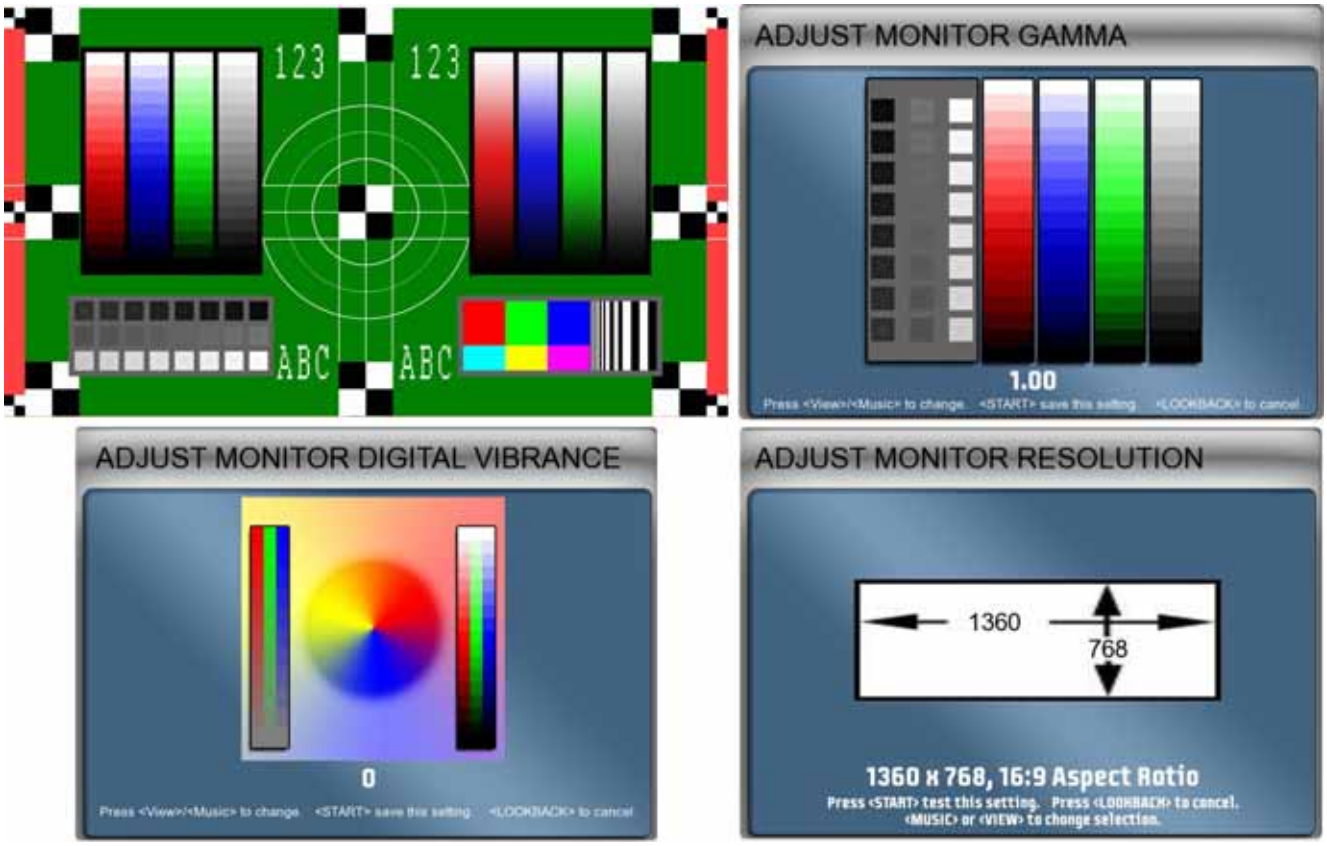
Diagnostics: Monitor Test Screens

The game has various screens to assist you with fine tuning the monitor.



- **Monitor Test:** When you select this menu item, it opens a series of screens designed to help you check monitor performance. Press any control panel button to cycle through a series of screens to test color and geometric alignment. Press the **LOOK BACK** button to exit.
- **Monitor Gamma:** This screen lets you adjust the overall screen brightness. Press **VIEW** or ♪ to raise or lower the gamma value. To exit without making changes, press **LOOK BACK**. To exit and keep the new setting, press **START**.
- **Monitor Vibrance:** This screen lets you adjust the overall vividness, or saturation, of the colors. Press **VIEW** or ♪ to raise or lower the vibrance level. To exit without making changes, press **LOOK BACK**. To exit and keep the new setting, press **START**.
- **Monitor Resolution:** This screen lets you change the monitor resolution. This feature is provided to enhance compatibility with a variety of monitors. In most cases, the software detects and sets up the optimal monitor resolution automatically. (Setting a different resolution may adversely affect performance.)

  To change the resolution, press ♪ or **VIEW** to cycle through the available options, and then press **START** to test the selected resolution. You will be prompted to press **START** again to keep the setting. Press **LOOK BACK** to exit without making any changes.

Diagnostics: Motion Test (Motion Cabinets Only)

This menu lets you test the motion drive motor.

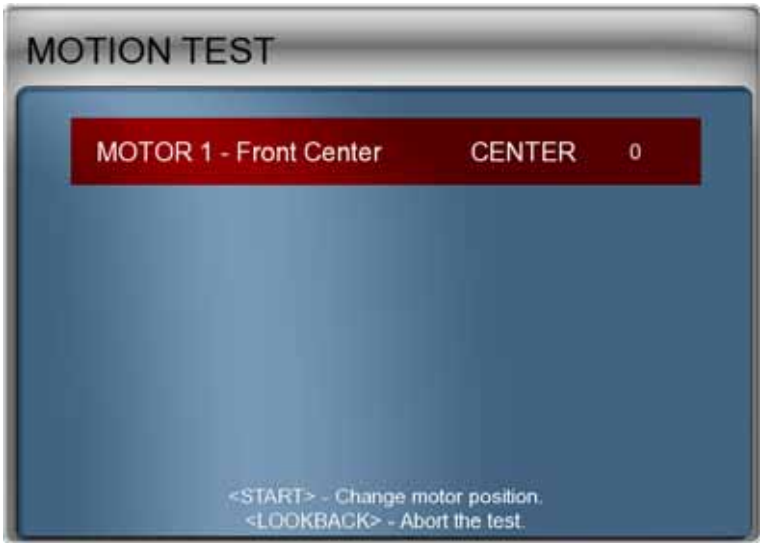
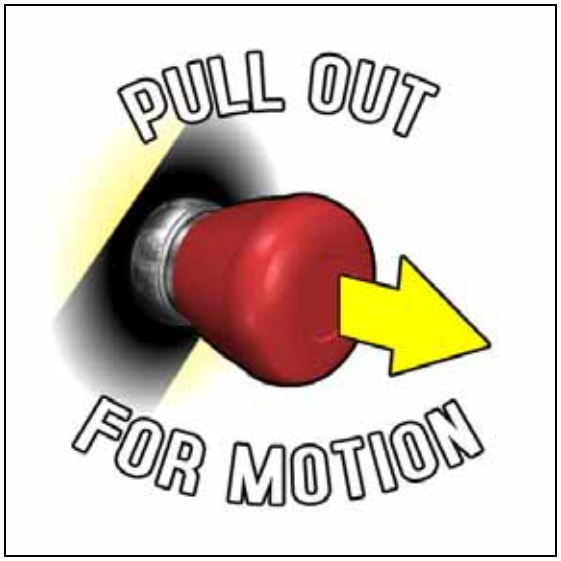


Figure 16. Motion Test Menu

If you select Motion Test from the Main Menu with the motion STOP button pushed in, you will be prompted to pull it up to activate motion with the graphic shown below.

Press **START** to cycle the motor to the next position. The motor will move to the position shown onscreen.

To calibrate, troubleshoot, or repair the Mini-Motion base, refer to your *Mini-Motion Base Service & Repair Manual*.



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Chapter 4 — Software Restoration

Important: When you run the System Recovery Disk, you will erase all game settings and audits. Open the Operator Menu and write down anything that you want to remember.

For best results, open the DVD-ROM Drive and inspect the tray. If it is dirty, gently wipe it with a clean, soft cloth or use a CD Laser Lens Cleaner, available at electronics and music stores, and even drugstores, to clean the lens in the drive to help ensure it reads the software disks properly. If you have continued problems with a drive, you can replace it with a plug-and-play compliant SATA DVD-ROM drive.

Important: All linked cabinets must run the same software Comm version displayed in the Machine Info screen of the Operator Menu. (For best results, install the same software version on all linked cabinets.)

Software Restoration takes about 20 minutes.

Run the System Recovery CD

1. Insert the System Recovery Disk in the DVD-ROM drive and power the cabinet OFF and then ON. When the computer reboots, the CD should run automatically (wait about a minute). You will see messages onscreen as files are copied to the hard drive.
2. After about 4—5 minutes, the computer will eject the CD and prompt you to remove the CD and reboot the computer. Do not insert the Game Install Disk yet! The software will setup the drivers and then reboot after about 5 minutes. After another 3 minutes, you will be prompted to "Please insert Twisted Game Disk number 1." Proceed to Run the Game Install DVD.

Run the Game Install DVD

1. With the cabinet powered ON, insert the DVD labeled **Game Install Disk 1 of 1**. The DVD will automatically run. You will see a series of onscreen messages as the software copies components and files to the hard drive. After about 5 minutes the game will automatically reboot and then finalize the software installation.
2. About 8 minutes after you inserted the Game Install Disk a screen will appear saying "There is a CD in the drive." Remove the DVD and press the **START** button. Keep the disks in a safe place in case you need them in the future.

Test and Set Up

1. After you remove the disk and press the **START** button, you will be prompted to calibrate the accelerator and brake. Press each pedal firmly to the floor to set the calibration limits. Next, the steering will self-calibrate; Do not touch the wheel while it is calibrating.
2. If the software detects another cabinet with the same Link ID Number, the Select a Link ID screen will appear and prompt you to change the ID. Turn the wheel to select an available Link ID and press the **START** button.

   Note: If you install software on linked cabinets simultaneously, the first one finished will automatically be assigned Link ID #1, so you may need to change it in the Operator Menu.
3. Once the attract movie begins, play one game to finalize hardware calibration and verify proper operation.
4. Press the Operator button and set the sound volume levels and any other desired cabinet settings from the Operator Menus.

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Chapter 5 — Service and Repair Procedures

CAUTION: GLOBAL VR assumes no liability for any damage or injuries incurred while servicing the cabinet. Only qualified service personnel should perform service and installation of cabinet hardware.

To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

Please read the service instructions before working on the cabinet.

WARNING: Be very careful when working on the moving parts in the Mini-Motion Base. When you open the Mini-Motion Base, secure all loose clothing, jewelry, and hair to prevent them from getting caught in the moving parts.

DANGER

Always turn the cabinet OFF and disconnect the AC Power Cord before performing any repair work.

For Mini-Motion Systems, disconnect BOTH AC Power Cords.

Note: Procedures in this chapter are the same for all cabinet configurations unless noted.

Access Panels on Cabinet Rear

Figure 17. Cabinet Access Panels

Use the three access panels on the rear of the cabinet to service internal components. Access Panels are similar on all Cabinet configurations.

Monitor Access Door: Open to access LCD monitor, monitor power supply, and cooling fan.

Electronics Access Panel: Remove four (4) Torx® screws to open the panel and access the Audio Amp PCB, GVRI/O Mini PCB, Force-Feedback Steering PCB, and associated DC power supplies.

Rear Door: Open to access Computer and AC Power Distribution components.

Note: Figure 17 shows a 42" Cabinet. Access Panels are in the same places on a 32" Cabinet.

Removing the Control Panel

Do the following to remove the control panel from the front of the cabinet to replace the BOOST buttons or control panel lighting, or service the steering assembly.

Note: You do **not** need to remove any of the screws that go through the plastic dash housing to remove the control panel assembly from the cabinet.

1. Disconnect the cabinet from AC power.
2. To protect the steering pot, remove the Electronics Access Panel and reach through to disconnect the steering pot harness. This removes the risk of breaking the pot if the pot harness is pulled.
3. Remove the three (3) screws above and three (3) screws below the control panel that secure the metal control panel mounting bracket to the cabinet wood.
4. Grip the Steering Wheel and use it to carefully pull the control panel assembly straight out from the cabinet. Be careful not to pull the wires as this could damage the steering pot if it is not disconnected. The wire harnesses should be long enough for you to place the assembly in your lap as you sit in the driver's seat.
5. Disconnect the harness connectors from the steering motor and button harness.
6. Reverse these steps to re-install the control panel assembly.

Disassembling the Control Panel

To replace the BOOST buttons or CCFL tubes, you will need to disassemble the control panel. See page 80 for an exploded-view of the steering wheel assembly.

1. Remove the control panel from the cabinet as described in the previous section.
2. Remove the six (6) T-15 Torx bolts from the center of the steering wheel and remove the cap.
3. Remove the three (3) Socket-head screws from the center of the steering wheel.
4. Remove the 3/4" nut from the center shaft of the steering wheel and remove the wheel
5. Remove the screws that secure the plastic dash housing in place. Carefully remove the housing being careful not to pull the BOOST button wires.
6. Reverse these steps to reassemble the control panel. Be sure to securely tighten the nut and socket head screws in the steering wheel.

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Force-Feedback Steering System Service

The major components of the force-feedback steering system are listed below. Figure 18 shows the harness connections. See Figure 37 on page 80 for an exploded-view drawing of the steering wheel and motor assembly, showing the parts in detail.

- Steering Wheel
- Steering Motor
- Force-Feedback PCB (part #: 990-0040-01)
- +24 VDC Power Supply
- 5 KΩ Steering Pot (Potentiometer)

The Force-Feedback PCB manages communications between the 5 KΩ steering pot and the computer (via a USB connection). The steering pot sends the computer the steering wheel position as the player drives, and the computer sends back instructions for controlling the steering motor by regulating the power. The force-feedback steering motor is powered by the +24 VDC power supply via the Force-Feedback PCB.

CAUTION: Do not connect the power supply directly to the steering motor. Doing this will damage the motor and the power supply.

A faulty cable or steering-system component can cause steering problems. Refer to *Control Troubleshooting* on page 69 for help with diagnosing steering problems.

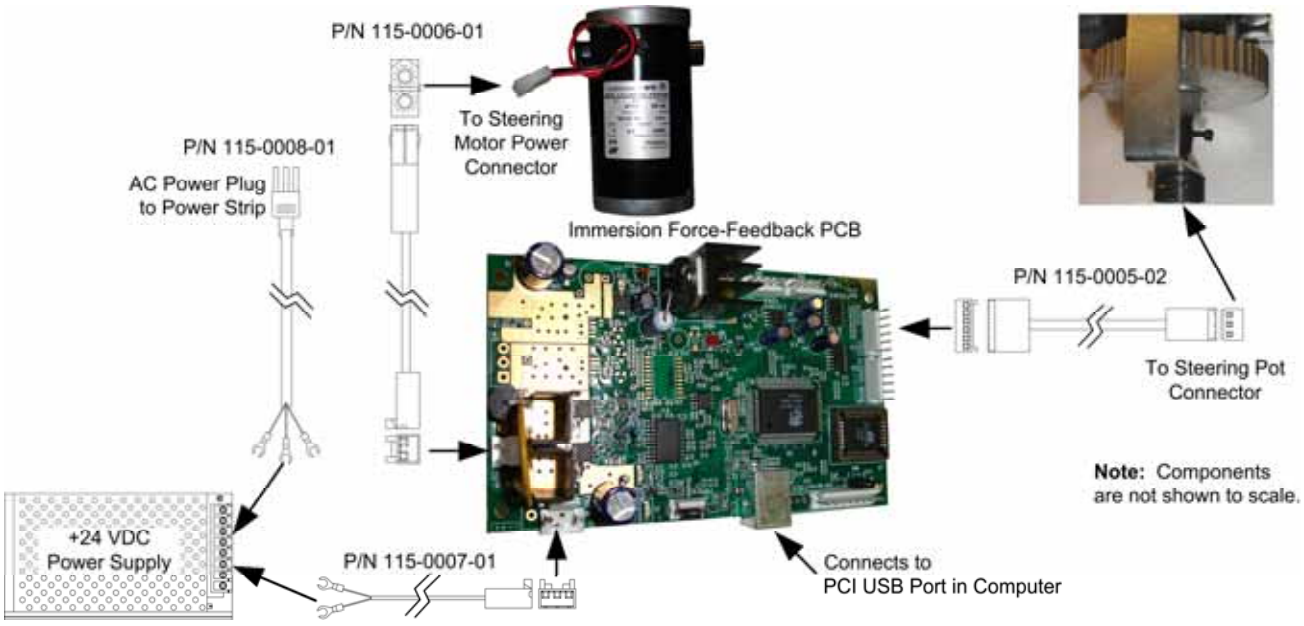
P/N 115-0006-01
To Steering Motor Power Connector
P/N 115-0008-01
AC Power Plug to Power Strip
Immersion Force-Feedback PCB
P/N 115-0005-02
To Steering Pot Connector
Note: Components are not shown to scale.
+24 VDC Power Supply
P/N 115-0007-01
Connects to PCI USB Port in Computer

Figure 18. Force-Feedback Steering System Harnessing Diagram

5 KΩ Steering Pot (Potentiometer) Replacement

To test a pot, use the **Diagnostics: Play Control Test** screen in the Operator Menu (see page 31). While turning the wheel, the change in the numbers displayed onscreen above the steering wheel picture should be smooth and linear, with no jumps. You can also power off the game and test resistance at the pot. While turning the wheel, you should see a steady linear increase or decrease in resistance, with no jumps. Jumps could indicate a bad pot or a loose steering column set screw. Use Loctite Blue on the set screw to ensure it is secure.

To replace a pot, refer to Figure 19 and perform the following steps:

1. Remove the control panel assembly as described on page 39 and take it to a workbench.
2. Using a 7/64 Allan wrench, loosen the set screw from the steering column and remove the bracket with the 5 KΩ steering pot attached.
3. Using a 1/2-inch wrench, remove the nut and lock washer from the bracket and remove the pot.
4. Reverse these steps to install the new pot. Install the pot with the plastic pin through the small hole in the bracket, as shown in Figure 19. Use Loctite Blue to ensure the set screw is secure.
5. Calibrate the steering from the Play Control Test in the Operator Menu after replacing the pot (see page 42).

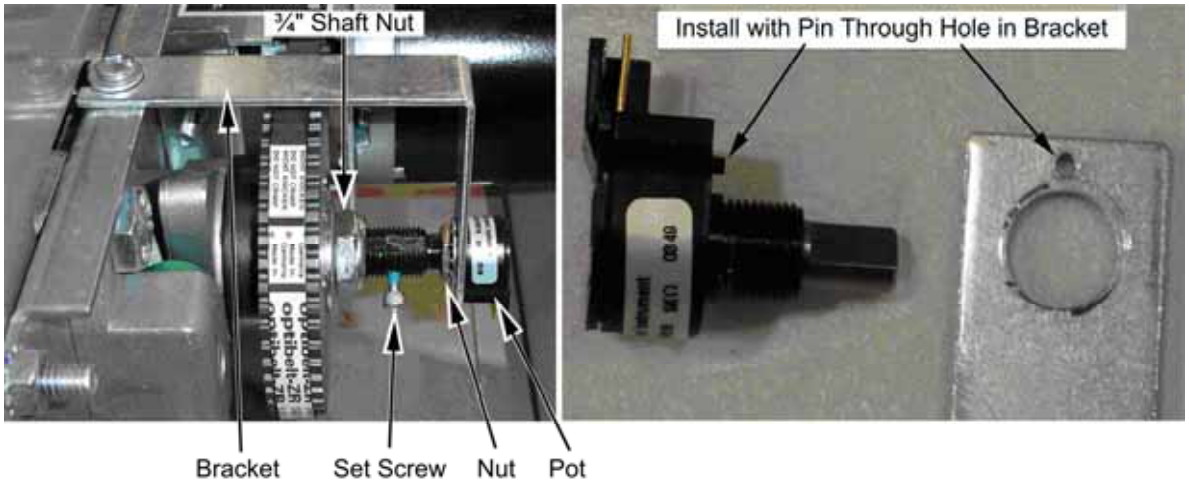

Figure 19. Replacing the 5 KΩ Steering Pot

Force-Feedback Belt or Steering Motor Replacement

It is a good practice to inspect the steering belt and gears periodically. Always replace a belt that looks stretched, cracked, or worn. Replace a gear that looks worn.

Refer to Figure 19 above, and Figure 20, and perform the following steps to remove the force-feedback belt for repair.

1. Remove the control panel assembly as described on page 39 and take it to a workbench.
2. Using a 7/64 Allan wrench, loosen the set screw from the steering column and remove the bracket with the pot attached (see Figure 20).
3. Loosen the four (4) 3/8" motor mount Kep nuts that secure the steering motor to the frame (see Figure 20).
4. Using a 10mm socket wrench, loosen the belt tension adjustment bolt several turns until you can slip the belt off of the motor and steering gears (see Figure 20).
5. Inspect the motor gear (the small gear) for wear. A worn gear can quickly wear out a belt. Make sure the two gears are aligned to prevent stress on the belt. Use Loctite Blue on the set screws to ensure they are secure.
6. To replace the motor, remove the four (4) 3/8" Kep nuts that you loosened in step 2, and remove the motor.
7. Reverse these steps to re-install the motor and belt. Adjust the belt tension as described below.

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Force-Feedback Belt Tension Adjustment

The belt tension should be adjusted on a new cabinet after one month of initial operation. After that it should be adjusted every 60—90 days for optimal performance. Inspect the gears for wear at the same time. A worn motor gear can wear out a belt.

1. Tighten the tension adjustment bolt on the motor assembly, shown in Figure 20, until the belt is fully stretched, and then loosen the bolt by ½ turn.
2. Calibrate the steering from the Operator Menu after servicing the belt or motor (see page 42).

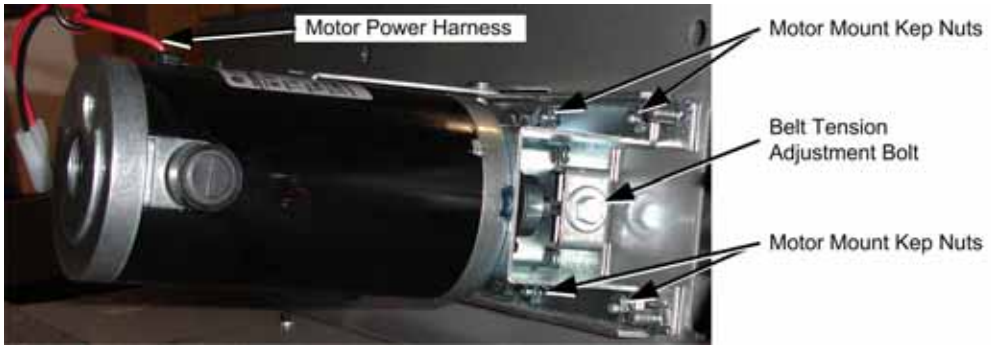

Figure 20. Servicing the Steering Motor

Force-Feedback PCB Replacement

CAUTION: To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

If the steering pulls to one side, this could indicate a bad force-feedback PCB or reversed wires between the steering pot and the PCB. Use the following steps to replace the PCB.

1. Disconnect the cabinet from AC power.
2. Remove the electronics access panel (see page 38).
3. Disconnect all cables from the PCB.
4. Remove the four screws that secure the PCB to the mounting feet.
5. Reverse these steps to install the new PCB. Make sure there is some clearance between the PCB components and the cabinet wall to allow air to circulate around the components.
6. Calibrate the steering as described below.

Calibrating the Steering and Pedals

Do the following to calibrate the steering wheel and pedals:

1. Open the **Play Control Test** screen in the Operator Menu.
2. Press the **START** and ♪ buttons together to reset the pots to 0. A ⃠ symbol will appear over the pictures of the pedals and wheel.
3. Turn the steering wheel all the way to the left and the right to set the pot limits.
4. Press each pedal all the way down to set the pot limits.

Pedal Assembly Service

Perform the following steps to remove the pedal assembly. It is removed and installed as one unit. See Figure 36 on page 80 for an exploded view of the assembly with parts list.

1. Disconnect the cabinet from AC power and remove the rear door from the cabinet.
2. Remove the four (4) 1/4-20 Security Torx bolts that secure the pedal assembly to the cabinet, as shown by the arrows in the first part of Figure 21.
3. Carefully pull the pedal assembly straight out of the cabinet, being careful not to pull the wires, enough to disconnect the wires.
4. Disconnect the pedal harness from the main harness.
5. Disconnect the ground wire from the pedal assembly frame.
6. Reverse these steps to reinstall the pedal assembly.
7. After servicing, calibrate the pedals from **Diagnostics: Play Control Test** in the Operator Menu (see page 42).

Important: Be sure to replace the ground wire. It is needed to ensure proper pedal function.

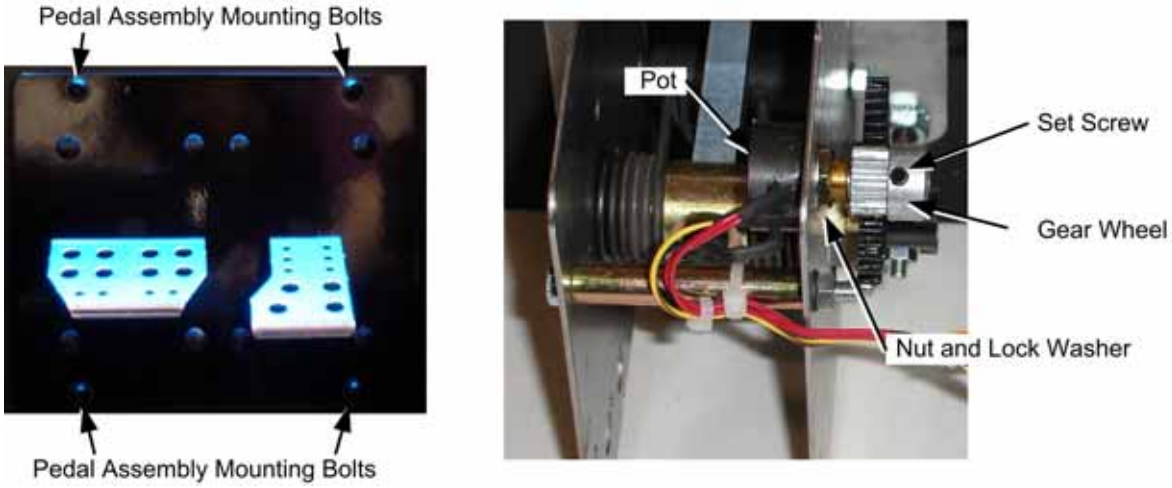

Figure 21. Pedal Assembly Details

5 KΩ Gas and Brake Pot (Potentiometer) Replacement

To test a pot, use the **Diagnostics: Play Control Test** screen in the Operator Menu. When you press and release the pedals, you should see a steady increase or decrease in the numbers displayed onscreen near the pedals, with no jumps. The low value should be greater than 0, and the high value should be less than 255.

You can also power off the game and test resistance at the pot. When you press and release the pedals, you should see a steady linear increase or decrease in resistance, with no jumps.

To replace a pot, refer to Figure 21 and perform the following steps:

1. Remove the pedals from the cabinet as described in the previous section.
2. Using a 7/64 Allen wrench, loosen the set screw from the gear wheel and remove the gear wheel, as shown in Figure 21.
3. Using a 1/2" wrench, remove the nut and lock washer that secure the pot to the frame.

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4. Install the new pot with the same orientation. Make sure that the plastic keys on the pot match with the metal.
5. De-solder each wire from the old pot. Slide shrink tubing over the wire, solder it to the same terminal on the new pot, and shrink the tubing around the connection.
6. Re-install the lock washer and nut, being careful not to over-tighten.
7. Re-install the gear wheel and tighten the set screw. Use Loctite Blue to ensure the set screw is secure.
8. Calibrate the pedals from **Diagnostics: Play Control Test** in the Operator Menu after replacing the pot (see page 42).

Driving Control Panel Button Service

Refer to Figure 22 and perform the following steps to replace a button, bulb, or micro switch:

1. Disconnect the cabinet from AC power.
2. For all except the BOOST buttons, remove the four (4) screws that secure the button mounting plate to the cabinet. Remove the plate with the buttons attached, being careful not to pull the wires.
3. For the BOOST buttons, remove and disassemble the control panel as described on page 39 to access the buttons.
4. Refer to the figure below to replace button components. When connecting the wires to the micro switch and bulb, refer to the labels on the wires and make sure the connections are correct. See Figure 22 for more information.

CAUTION: Do not connect the 5-volt lamp power wire to the micro switch. This can damage the GVRI/O Mini PCB.

Figure 22. Replacing Button Components

GVRI/O Mini PCB Service

Twisted requires GVRI/O Mini PCB firmware version 047*x* or higher (current version is 0471).

To check the firmware version, open the **Machine Settings: Info** screen in the Operator Menu and check the last four digits displayed for **IO Board**. For example, if the screen says "**`IO Board: GvrIOmini 0x7021 ver 0x0471`**," the version is 0471.

The GVRI/O MINI PCB relays signals between the system computer and all hardware except for the steering. Each connector on the GVRI/O MINI PCB is keyed to fit only to the correct harness connector. Refer to Figure 23 to locate the connectors on the PCB. See Figure 45 on page 88 for detailed wiring information.

The GVRI/O MINI PCB should always be connected to a PCI USB port, **not** a motherboard USB port, to minimize the possibility of static shock. No jumpers are required on the PCB. Jumpers will be ignored if installed.

CAUTION: Disconnect the cabinet from AC power before changing any connections to the GVRI/O MINI PCB.

J2 - +5/+12 VDC Power In
Audio Amp Heat Sink
(Not used with this Game)
J10 – Button Lamps &
Coin Meter
J5 – Mode Select
(No Jumpers)
J1 - USB to PCI USB Port
on System Computer
J7 – Start, Music, Lookback
& View Buttons
J8 – Coins & Operator Buttons
J9 – Shifter
J6 – Gas & Brake

Figure 23. GVRI/O Mini PCB (Version 4)

Perform the following steps to replace the GVRI/O Mini PCB:

CAUTION: To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

1. Disconnect the cabinet from AC Power.
2. Remove the electronics access panel (see page 38).
3. Make sure that all wire harnesses are labeled for ease of reconnection, and then disconnect them from the PCB. (Connectors are keyed to prevent connecting them to the wrong ports.)
4. Remove the four screws that secure the PCB to the mounting feet.
5. Reverse the removal steps to install the new PCB.

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Seat Slide Assembly Replacement

To replace the slide assembly, refer to the figure below and perform the steps that follow.

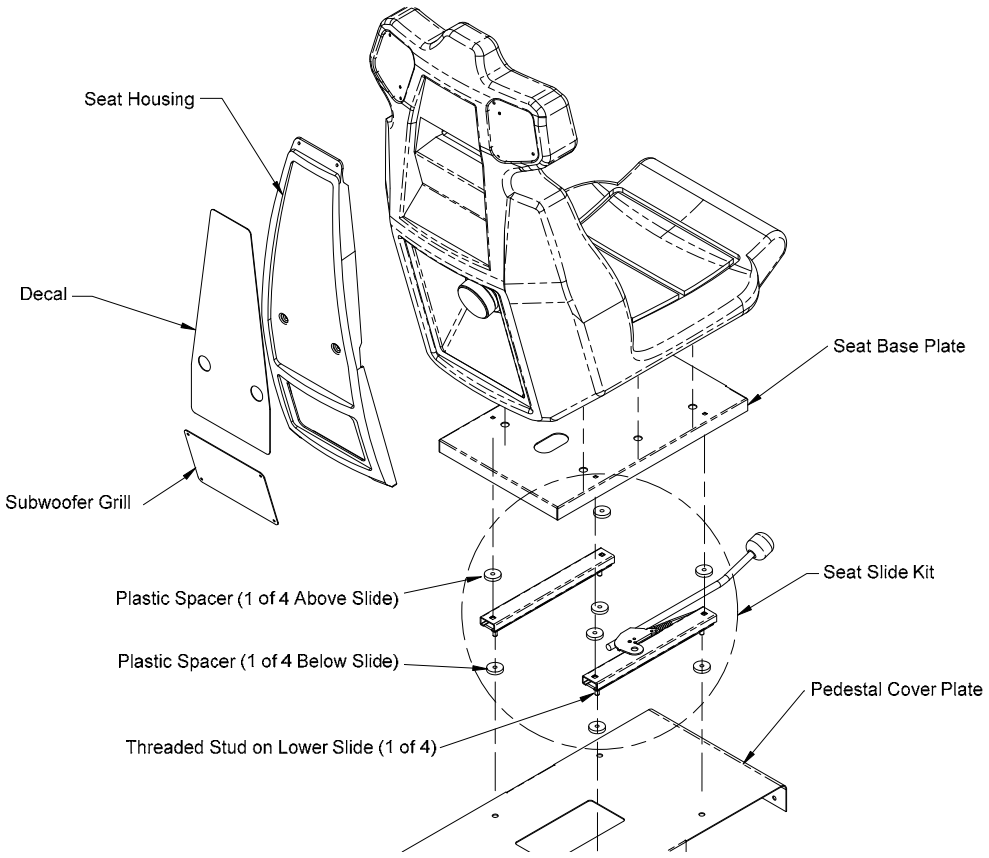
Seat Housing
Decal
Subwoofer Grill
Seat Base Plate
Seat Slide Kit
Plastic Spacer (1 of 4 Above Slide)
Plastic Spacer (1 of 4 Below Slide)
Pedestal Cover Plate
Threaded Stud on Lower Slide (1 of 4)

Figure 24. Seat Slide Assembly Replacement

1. Remove the six (6) Torx bolts that secure the pedestal cover plate to the wooden pedestal.
2. Carefully lift the seat assembly and place it on its side. Be careful not to pull the speaker wires that run from the pedestal into the seat. You may need to reach inside the pedestal and snip wire ties to create slack in the wires.
3. Remove the four (4) nuts and flat washers from the bottom of the pedestal cover plate and remove the cover plate, and the four (4) plastic spacers from the seat assembly. Note the placement of each component.
4. Remove the four (4) nuts and flat washers that secure the slide assembly to the seat base plate. Move the lower slides to each side to access all four nuts.

   Note: When reassembling, be careful to install the four (4) plastic spacers above and below the slide assembly. A missing spacer will cause the seat to wobble and may cause damage. If necessary, flat washers stacked to equal the thickness of the spacer can be used to replace a lost spacer.

5. Reverse these steps to re-assemble the seat. Use the following specs when tightening the nuts to prevent the seat from gradually becoming loose due to motion during gameplay:

   - Seat Base Plate to Slide Assembly: Either replace the ¼-20 flange nuts with ¼ Nylock nuts, **or** apply Loctite Blue (or a comparable product) to the threads. Tighten the nuts to 4–6 ft lbs (48–72 in lbs).
   - Pedestal Cover Plate to Slide Assembly: Either replace the 5/16-18 flange nuts with 5/16 Nylock nuts, **or** apply Loctite Blue (or a comparable product) to the threads. Tighten the nuts to 9–12 ft lbs (108–144 in lbs).

   Important: Loctite can damage plastics. Be careful not to get the Loctite on the plastic seat, and **do not** use Loctite with Nylock nuts.

Audio Amp and Speakers Service

The Audio Amp supports 6-channel 5.1 Surround Sound. The Audio Amp is powered by the +5/+12 volt DC power supply through a standard PC power connector.

The volume level for each channel on the Audio Amp can be manually adjusted using a small screwdriver to turn the pots, shown in Figure 25. For the subwoofer channel, turn the pot clockwise all the way for maximum volume. For the other channels, turn the pot counterclockwise to turn the volume levels all the way down, and then turn the pot 1/5 of a turn clockwise to bring the volume levels up. Fine-tune the sound levels for your location from this point.

Note: For best sound balance, turn front speakers all the way up, and the rest just above mid-range.

Use the **Diagnostics: Sound Test** screen in the Operator Menu to test the speakers.

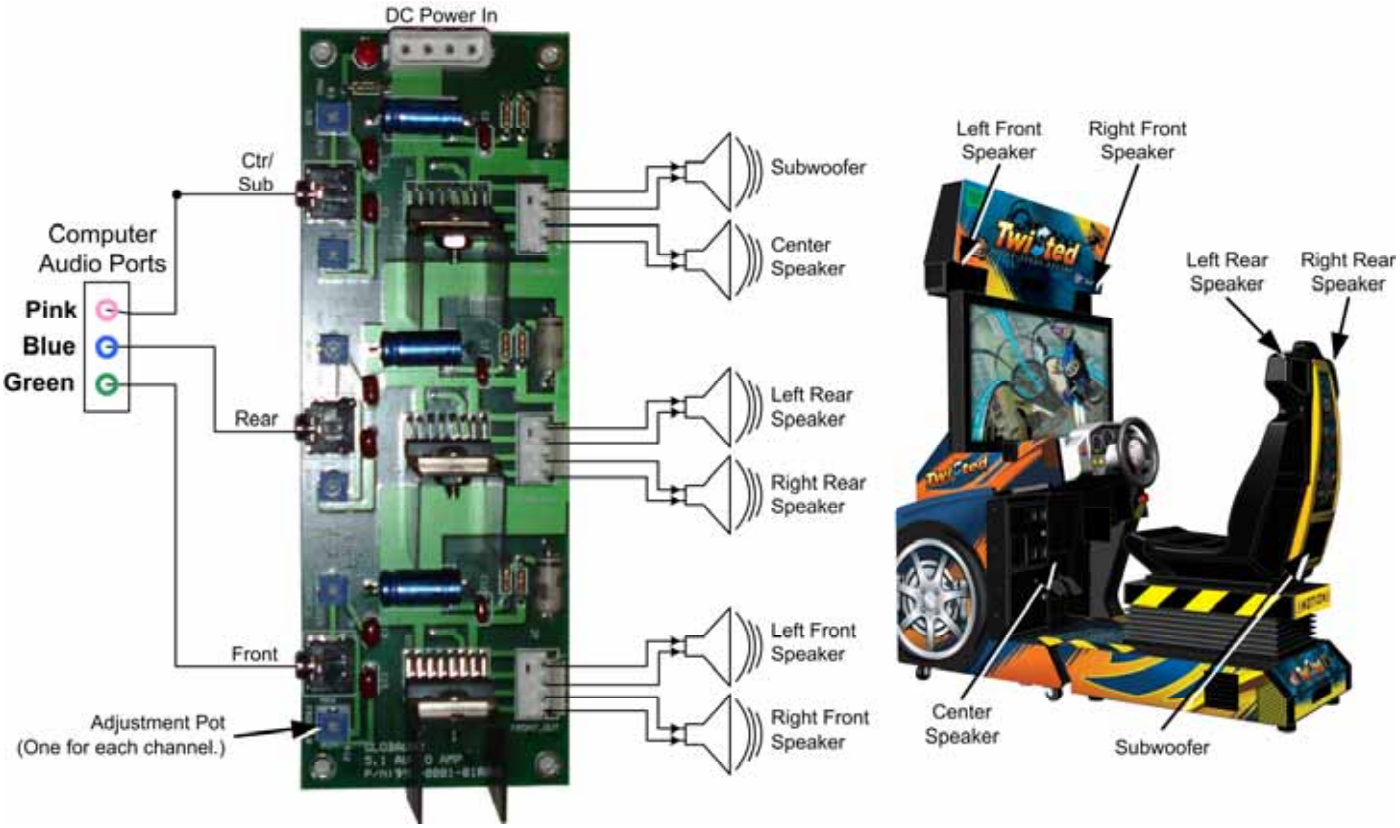

Figure 25. Audio Amp and Speakers

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Three 3.5 mm stereo audio cables connect the computer audio ports to the audio amp. Each audio port on the computer is color coded to help identify the channel. See Figure 41 on page 84 for a diagram of the computer rear panel.

- The **green** audio port is for front speakers, left and right.
- The **blue** audio port is for rear speakers, left and right.
- The **pink** audio port is for center channel and bass speaker (subwoofer).

Each speaker is connected to the corresponding speaker output on the audio amp. Figure 25 shows the location of each speaker.

Audio Amp PCB Replacement

CAUTION: To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

1. Disconnect the cabinet from AC Power.
2. Remove the electronics access panel (see page 38).
3. Disconnect the power harness, speaker wires, and 3.5mm audio cables from the audio amp PCB. Make sure all connectors are labeled to make it easy to reconnect them properly.
4. Use a small Phillips screwdriver to remove the four (4) screws holding the PCB to the mounting feet.
5. **Note:** Always keep the audio amp PCB inside an ESD anti-static bag when not installed in the cabinet to prevent electrostatic damage.
6. Reverse these steps to re-install the audio amp PCB.

Front (Marquee) Speaker Replacement (32" Cabinet)

The front speakers are located behind the grills on each side of the marquee. You can remove the grills to inspect the speakers but may need to remove the marquee housing to replace a speaker.

1. Remove the eight (8) Torx screws that secure the marquee artwork and clear plastic in place and remove the artwork and plastic.
2. Inside the marquee, remove the six (6) screws around the florescent fixture that secure the plastic marquee housing in place, and remove the marquee housing.
3. Remove the four (4) screws that secure the speaker to the cabinet.
4. Disconnect the wires from the speaker and install them to the same connectors on the new speaker.
5. Reverse these steps to install the new speaker.

Front (Marquee) Speaker Replacement (42" Cabinet)

Refer to Figure 34 on page 59 for an exploded view of the marquee and speakers. The front speakers are mounted below the marquee. Do the following to replace a speaker:

1. Remove the ten (10) Torx screws that secure the marquee artwork and clear plastic in place. Carefully tilt the clear plastic piece outward enough to disconnect the leader light connector, and then remove the clear plastic with the leader light assembly and artwork.

2. Disconnect the speaker harness connector inside the marquee. (If there is no connector here, you must remove the speaker and mounting box before you can disconnect the speaker wires.)
3. Remove the nuts from the two (2) speaker mounting bolts and remove the speaker with its mounting bracket. Be careful not to pull the speaker wires.
4. Remove the screws that secure the mounting bracket to the speaker.
5. Remove the wires from the speaker and install them to the same connectors on the new speaker.
6. Reverse these steps to install the new speaker.

Center Speaker Replacement

The center speaker is located near the pedals on the right side wall. Do the following to replace the center speaker:

1. Remove the four (4) Torx security screws that secure the speaker grill in place.
2. Remove the four (4) Phillips screws that secure the speaker in place.
3. Disconnect the wires from the speaker and install them to the same terminals of the new speaker.
4. Reverse these steps to install the new speaker.

Rear (Seat) Speaker or Subwoofer Replacement

The rear speakers are located behind the two small grills at the top rear of the seat. The subwoofer is located behind the molded plastic housing on the back of the seat.

1. **To replace the Subwoofer**, remove the six (6) Torx screws that secure the molded plastic housing on the back of the seat, and remove the housing. Skip to step 3.

   To replace the left or right rear speaker, remove the four (4) 1/4-20H Torx security screws that secure the speaker grill to the back of the seat.
2. Remove the four (4) screws that secure the speaker or subwoofer to the seat.
3. Disconnect the wires from the speaker or subwoofer and install them to the same terminals on the new speaker or subwoofer.
4. Reverse these steps to install the new speaker or subwoofer.

Computer Replacement

CAUTION: The computer is serviced as one unit. YOU WILL VOID YOUR WARRANTY if you open the computer case without direct authorization from the GLOBAL VR Technical Support staff.

Perform the following steps to remove the computer from the cabinet:

1. Disconnect the cabinet from AC power and remove the rear door from the cabinet.
2. Disconnect all of the cables from the computer.
3. Remove the Game Dongle and keep it with your cabinet. **Do not** ship the Game Dongle with the computer. It contains information that needs to stay with the cabinet.
4. Unbuckle the strap that secures the computer in place and remove the computer.
5. Reverse these steps to install the new computer. Make sure that the computer air vents are not blocked. There is an air vent under the bottom front panel of the computer that is easily blocked by padding or debris. Be sure to reconnect your Game Dongle.

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6. After replacing a computer, you must calibrate the pedals (see page 42).
7. Set up your cabinet from the Operator Menu, and play a game to verify proper operation.

CAUTION: When shipping the computer, always use plenty of padding and protection. GLOBAL VR recommends shipping the computer in a box with three inches of foam padding on all sides. Shipping the computer without enough padding can VOID THE WARRANTY if the computer is visibly damaged from shipping.

LCD Monitor Service (42" Cabinet)

The 42" LCD Monitor is connected to an LCD Control PCB that provides the signal, power, and data to the monitor. The monitor is encased in a metal bezel and backbox assembly with a glass display shield to protect the LCD panel. The Control PCB is mounted to the backbox inside the cabinet. Power is provided by a dedicated 24 VDC power supply that connects to the Control PCB and the AC power strip. The sections that follow provide replacement procedures for LCD Monitor Assembly components. Figure 26 shows an exploded view of monitor assembly.

Note: If the monitor does not work, make sure the three harnesses between the control PCB and LCD panel are connected properly. Also check the DVI video cable and power connection.

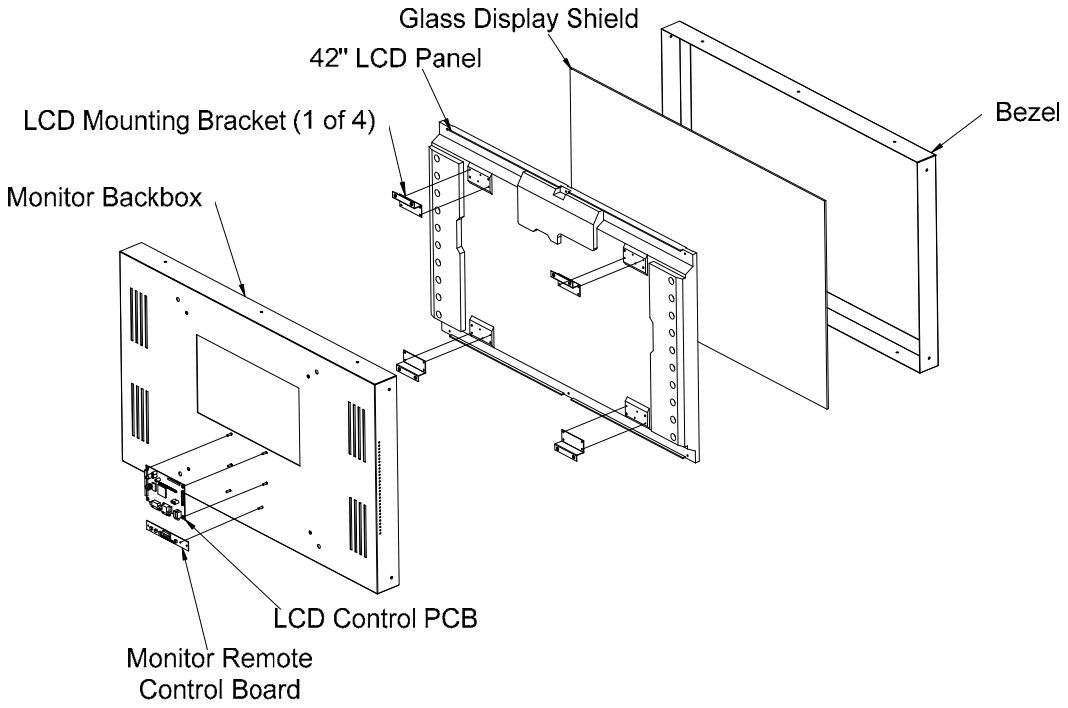

Figure 26. Monitor Assembly Exploded View (42" Cabinet)

Glass Display Shield Replacement (42" Cabinet)

Perform the following steps if you need to remove the glass display shield for cleaning or replacement:

1. Remove the five (5) screws, shown by the arrows in the picture below, from the LCD front cover bracket below the front of the monitor and remove the bracket.

Figure 27. LCD Front Cover Bracket (42" Cabinet)

2. Remove the seven (7) screws that secure the bezel in place around the front of the monitor.
3. Carefully lift the bezel and glass away from the monitor.
4. Reverse these steps to replace the bezel and glass.

LCD Monitor Replacement (42" Cabinet)

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

For Mini-Motion Systems, disconnect BOTH AC power cords.

1. Disconnect the cabinet from AC power.
2. Refer to Figure 27 and remove the five (5) screws from the LCD front cover bracket below the front of the monitor. Remove the bracket.
3. Remove the Monitor Access Door behind the monitor.
4. Disconnect the video cable from the back of the LCD Control PCB.
5. Disconnect the monitor DC power wires from the monitor power supply terminals (you *do not* need to disconnect the AC wires from the power strip).
6. Remove the two (2) Phillips screws that secure the DC power supply in place so you can move it out of the way to reach the monitor mounting bolts.
7. Remove the four (4) bolts that secure the monitor backbox to the mounting brackets inside the cabinet. Figure 28 shows the locations of the bolts inside the cabinet

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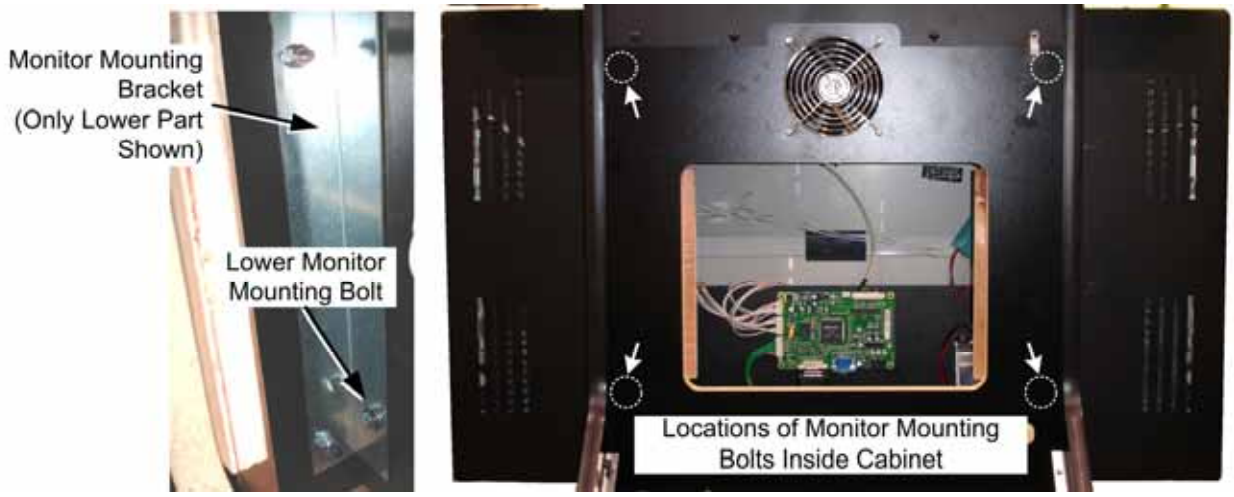
Monitor Mounting Bracket (Only Lower Part Shown)
Lower Monitor Mounting Bolt
Locations of Monitor Mounting Bolts Inside Cabinet

Figure 28. Monitor Mounting Bolts (42" Cabinet)

8. Carefully lift the monitor, bezel, and glass out of the cabinet as one unit. This is easiest to do with a person on each side of the assembly.
9. Place the LCD monitor assembly face down on a safe working surface.
10. Refer to Figure 29 for monitor assembly components. Carefully disconnect the three (3) wire harnesses that connect the LCD panel to the LCD Control PCB on the back of the assembly.
11. Remove the seven (7) screws that secure the bezel in place around the front of the monitor.

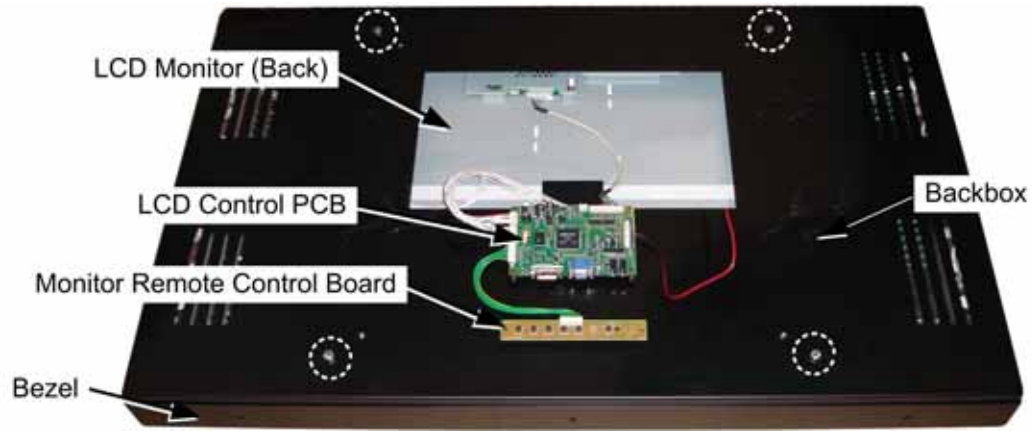

Figure 29. Monitor and Backbox Components (42" Cabinet)

12. Remove the four (4) bolts from the back of the backbox (shown by the circles in Figure 29) and lift off the backbox with the attached LCD Control PCB and Monitor Remote Control Board.
13. Lift the LCD panel out of the bezel.
14. Reverse these steps to install the new LCD monitor. Read the caution below and refer to Figure 30 to avoid breaking the LCD Control PCB connector.

CAUTION: It is very EASY TO BREAK the plastic housing around the connector on the LCD Control PCB. Align the connector carefully, and gently push straight in with your thumbs on both sides. DO NOT FORCE. Pressing too hard can break the plastic. See Figure 30 for the correct way to connect the harness.

Monitor Control PCB Replacement (42" Cabinet)

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

For Mini-Motion Systems, disconnect BOTH AC power cords.

CAUTION: To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

1. Disconnect the cabinet from AC power.
2. Remove the Monitor Access Door behind the monitor.
3. Refer to Figure 26 to identify monitor assembly components. Carefully disconnect all of the cables and wire harnesses from the Control PCB. (Depending on the PCB model, you may need to remove the PCB from the backbox before you can disconnect the power harness.)
4. Remove the four (4) screws that secure the PCB to the monitor backbox and remove the PCB.
5. Reverse these steps to install the new PCB. Read the caution below and refer to Figure 30 to avoid breaking the LCD Control PCB connector.

CAUTION: It is very EASY TO BREAK the plastic housing around the connector on the LCD Control PCB. Align the connector carefully, and gently push straight in with your thumbs on both sides. DO NOT FORCE. Pressing too hard can break the plastic. See Figure 30 for the correct way to connect the harness.

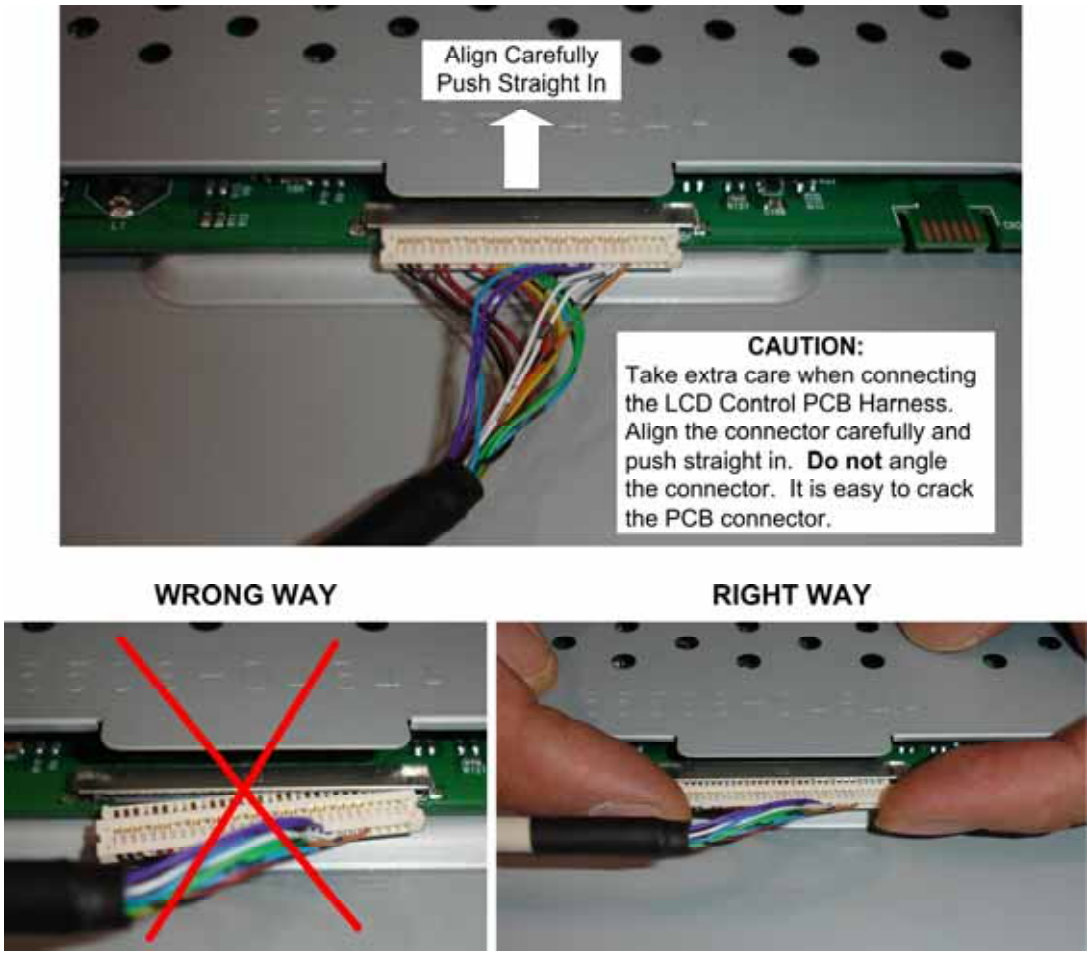
Align Carefully
Push Straight In
CAUTION:
Take extra care when connecting the LCD Control PCB Harness. Align the connector carefully and push straight in. Do not angle the connector. It is easy to crack the PCB connector.
WRONG WAY
RIGHT WAY

Figure 30. Connecting the LCD Control PCB Harness

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Monitor Power Supply Replacement (42" Cabinet)

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

For Mini-Motion Systems, disconnect BOTH AC power cords.

1. Disconnect the cabinet from AC power.
2. Remove the Monitor Access Door behind the monitor.
3. Make sure all wires connected to the power supply are properly labeled for easy reconnection, and then disconnect them from the terminals.
4. Remove the two (2) screws that secure the power supply mounting bracket to the cabinet and remove the power supply from the cabinet.
5. Remove the mounting bracket from the power supply and install it on the new power supply.
6. Reverse the removal steps to install the new power supply.

Note: If the monitor does not work, verify the power supply is putting out +24 VDC.

LCD Monitor Service (32" Cabinet)

The 32" LCD Monitor is connected to an LCD Control PCB that provides the signal, power, and data to the monitor. The monitor is encased in a metal frame with a glass display shield to protect the LCD panel. The LCD Control PCB and Monitor Power Supply are mounted to the back of the LCD assembly. The Monitor Power Supply connects to the AC Power Strip. The sections that follow provide replacement procedures for components of the LCD Monitor Assembly.

Note: If the monitor does not work, make sure the harnesses between the control PCB and LCD panel are connected properly. Also check the DVI video cable and power connection.

Note: Some configurations may vary.

Glass Display Shield Replacement (32" Cabinet)

1. Disconnect the cabinet from AC power.
2. Remove the screws from the sides of the monitor frame.
3. Carefully remove the frame and glass. Be aware that the glass is **not** secured to the frame.
4. Reverse these steps to install the new glass display shield.

LCD Monitor Replacement (32" Cabinet)

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

CAUTION: To prevent electrostatic discharge (ESD) damage, handle PCBs by the edges only and use a grounding wrist strap or similar precaution.

1. Remove the Display Shield and Frame as described in the previous section.
2. Remove the Monitor Access Door behind the monitor.
3. Disconnect the video cable from the back of the LCD Control PCB.

4. Check the power cord that connects to the power supply on the back of the monitor. Make sure it has enough slack so you can move the monitor out to disconnect the wires from the terminals. If necessary, snip some cable ties to create enough slack in the power cord.
5. Remove the four (4) bolts that secure the monitor L-brackets to the cabinet and carefully lay the monitor down above the control panel so you can access the power supply terminals.
6. Disconnect the wires from the power supply terminals, making sure they are labeled for proper reconnection.
7. Place the LCD panel on a work surface and carefully disconnect the wire harnesses from the LCD Control PCB and Power Supply.

CAUTION: It is very EASY TO BREAK the plastic housing around the connector on the LCD Control PCB. Align the connector carefully, and gently push straight in with your thumbs on both sides. DO NOT FORCE. Pressing too hard can break the plastic. See Figure 30 for the correct way to connect the harness.

8. Remove the L-Brackets, LCD Control PCB, and Power Supply, and install them on the new monitor.
9. Carefully reconnect the harnesses between the LCD panel and the LCD Control PCB and Power Supply.
10. Reverse the removal steps to install the new monitor in the cabinet.

Monitor Control PCB Replacement (32" Cabinet)

Perform the steps under *Monitor Replacement (32" Cabinet)*, above, but remove and replace only the LCD Control PCB from the monitor assembly in step 8. Be sure to see Figure 30 on page 53 for the correct way to connect the Control PCB Harness to avoid breaking the connector.

Monitor Power Supply Replacement (32" Cabinet)

Perform the steps under *Monitor Replacement (32" Cabinet)*, above, but remove and replace only the Monitor Power Supply from the monitor assembly in step 8.

Coin Mech Replacement

Perform the following steps to remove a coin mech. You can replace a coin mech with any standard arcade coin mech.

1. Unscrew the thumbscrews on the latches as shown by the arrows in step 1 of the figure below.
2. Slide the latches apart from each other and remove the Coin Mech as shown in steps 2 and 3.
3. Reverse these steps to re-install a coin mech. It is important to verify the operation of the newly installed coin mech with both good and bad coins.

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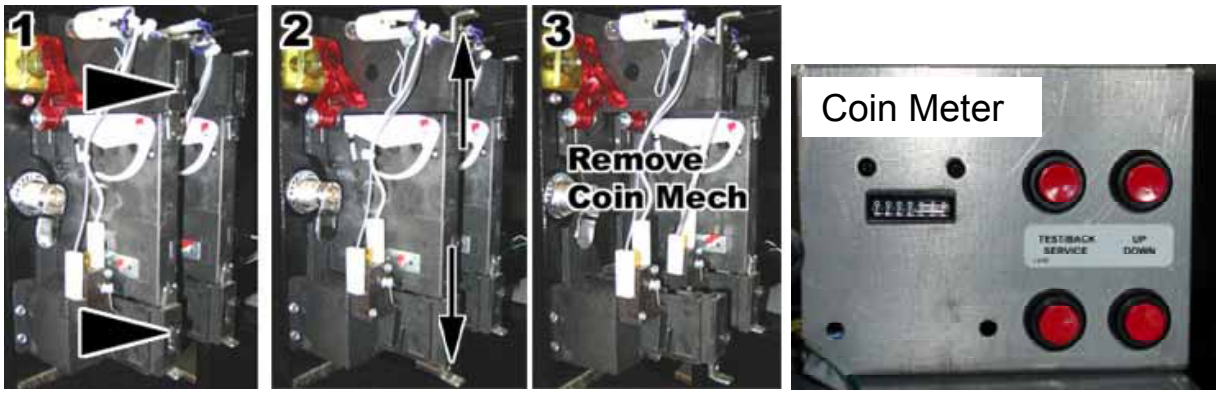

Figure 31. Servicing the Coin Mech and Coin Meter

Coin Meter Replacement

The coin meter is mounted to the operator button panel. Perform the following steps to remove the coin meter:

1. Turn the cabinet OFF and disconnect the AC power cord.
2. Remove the two Phillips screws holding the coin meter to the operator button panel and remove the coin meter.
3. Cut the two wires from the coin meter and strip the ends of the wires to attach the new meter.
4. Use two butt splices to connect the wires to the new coin meter.
5. Use the two screws to install the new coin meter.

Power Distribution Service

AC Power Plate

The AC power plate on the back of the cabinet provides the external AC power connection. Mini-Motion cabinets have separate power connectors and ON/OFF switches for the Display Cabinet and Mini-Motion base. The Mini-Motion Base Power is routed to the transformer in the Mini-Motion base.

An AC EMI Filter removes electrical noise that can cause interference with the hardware inside the cabinet, and a fuse protects the components. The filter and fuse for the Display Cabinet Power are located in the power plate; the filter and fuse for the Mini-Motion Base Power are located in the Electronics box in the base.

Display Cabinet AC power is routed through a power transformer to an AC power strip/surge suppressor that provides power to all 115 VAC cabinet components.

CAUTION: The cabinet must be connected to a secure ground to function properly.

Ground wires from system components must be securely connected to the ground lug on the power plate, as shown in Figure 32 and Figure 33. Do NOT ground components to the power plate mounting bolts.

The **Ethernet** port on the power plate is connected to the Ethernet port on the system computer. It is used for linking cabinets.

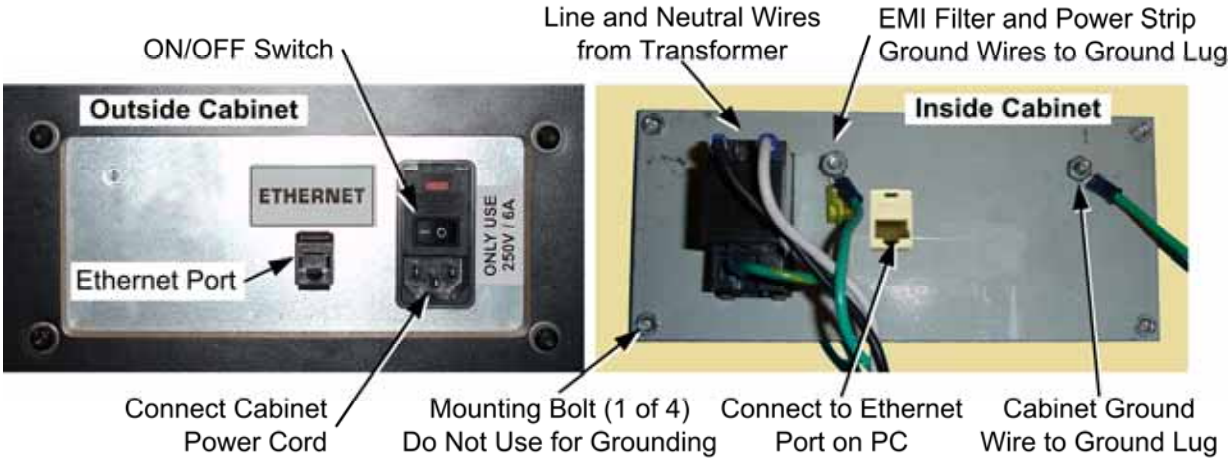
ON/OFF Switch
Line and Neutral Wires from Transformer
EMI Filter and Power Strip Ground Wires to Ground Lug
Outside Cabinet
ETHERNET
Ethernet Port
ONLY USE 250V / 6A
Inside Cabinet
Connect Cabinet Power Cord
Mounting Bolt (1 of 4) Do Not Use for Grounding
Connect to Ethernet Port on PC
Cabinet Ground Wire to Ground Lug

Figure 32. AC Power Plate, Non-Motion Cabinet

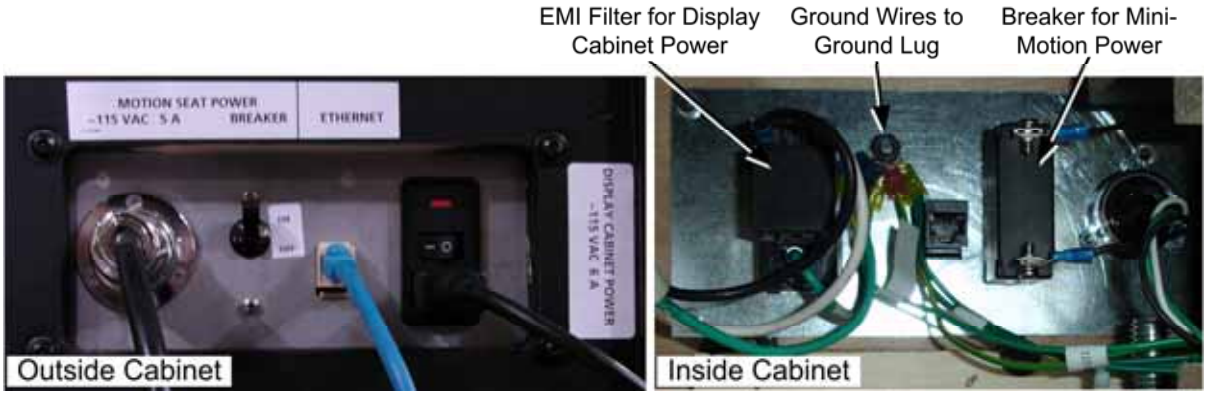
EMI Filter for Display Cabinet Power
Ground Wires to Ground Lug
Breaker for Mini-Motion Power
MOTION SEAT POWER ~115 VAC 5 A BREAKER
ETHERNET
DISPLAY CABINET POWER ~115 VAC 6 A
Outside Cabinet
Inside Cabinet

Figure 33. AC Power Plate, Mini-Motion Cabinet

AC Power Strip Replacement

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

For Mini-Motion Systems, disconnect BOTH AC power cords.

The AC power strip provides power to all of the components in the cabinet. Perform the following steps to replace the power strip:

1. Turn the cabinet OFF and disconnect from AC power.
2. Remove the rear door from the cabinet.
3. Disconnect all components from the power strip.
4. Disconnect the power strip Neutral and Line wires from the power transformer.
5. Disconnect the power strip Ground wire from the AC Power Plate ground lug.
6. Remove the power strip; it is held in place with Velcro®.
7. Replace the power strip with an appropriate unit from GLOBAL VR®. Do not use a different power strip. Be sure to connect each wire to the correct terminal. (See Figure 42 on page 85.)

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CAUTION: Be sure to connect each wire to the correct terminal. The ground wire must be securely connected to the ground lug on the power plate or the game will not function properly.

DC Power Supplies (+24 and +5/+12 VDC)

The cabinet has three DC power supplies (*NOT* including the power supply inside the computer).

- +24 VDC supply powers the Force-Feedback Steering System.

  Important: Connect **only** the steering components to this +24 VDC Power Supply. **Do not use** the +12 VDC Terminals on the Steering Power Supply.

- +5/+12/-12 VDC supply powers the Audio Amp, GVRI/O Mini PCB, lighting components, and the Ventilation Fan and PCBs in the Mini-Motion Base.

- +24 VDC supply powers LCD monitor. (For replacement procedures, see Monitor Power Supply Replacement (42" Cabinet) on page 54, or Monitor Power Supply Replacement (32" Cabinet) on page 55.)

Perform the following steps to replace a DC power supply (except for the monitor power supply):

DANGER

SHOCK HAZARD. Disconnect the AC power cord before performing the following procedure.

For Mini-Motion Systems, disconnect BOTH AC power cords.

If a power cord is damaged, it must be replaced by the equivalent power cord available from GLOBAL VR or your distributor.

1. Turn the cabinet OFF and disconnect the AC power cord (both cords for Mini-Motion systems).
2. Remove the electronics access panel (see page 38).
3. Make sure all wires are labeled for easy reconnection and then disconnect the wires from the DC power supply terminals.
4. Remove the two (2) Phillips screws holding the power supply to the cabinet. Be careful not to remove the screw that secures the terminal plate to the DC power supply.
5. Reverse the removal steps to install the new power supply. Check the labels on each wire and be sure to connect them to the correct terminals. See Figure 42 on page 85 for connection details.
6. Before connecting the DC output wires, connect a volt meter and adjust the output voltage from the pot on the front of the power supply as follows:
   - **+5/+12 VDC power supply**: Set the +5VDC output between +5.05 and +5.1 VDC.
   - **+24 VDC power supply**: Set the +24 VDC output to +24 VDC.

Cabinet Lighting Service

Marquee Florescent Light Service (42" Cabinet)

Refer to Figure 34. The Marquee is lighted by two 18" florescent fixtures. To replace only a florescent tube, perform the first two steps below and then replace the tube.

Do the following to replace a florescent fixture:

1. Disconnect the cabinet from AC power.
2. Remove the ten (10) Torx screws that secure the marquee artwork and clear plastic in place. Carefully tilt the clear plastic piece outward enough to disconnect the leader light connector, and then remove the clear plastic with the leader light assembly and artwork.
3. Disconnect the AC power connector that connects the fixture to the main harness.
4. Remove the two Phillips screws that secure the fixture to the cabinet and remove the fixture.
5. Reverse these steps to install the new fixture. Replace the fixture only with a comparable unit from GLOBAL VR.

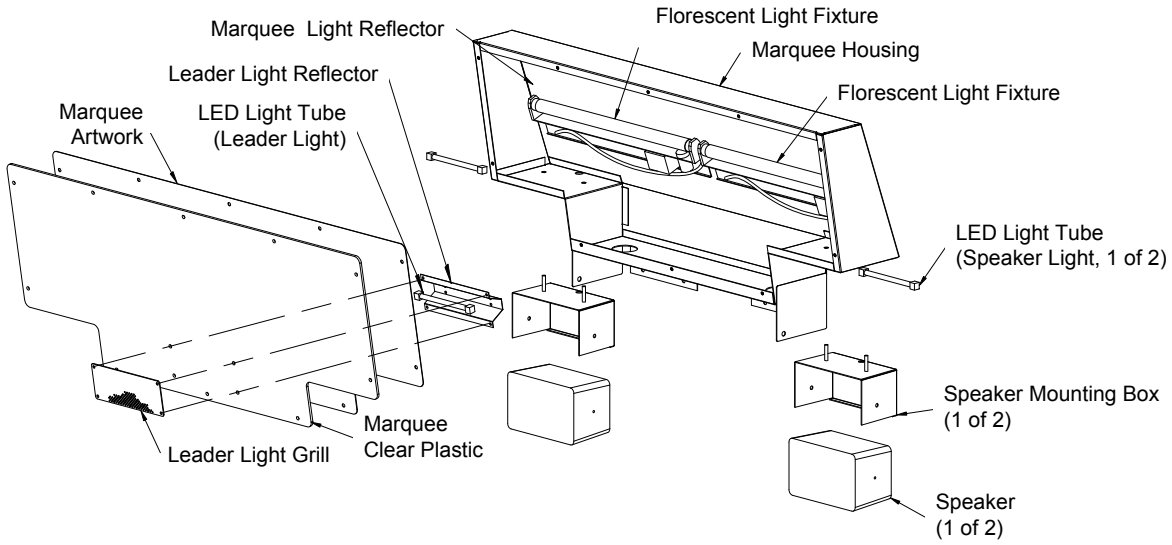

Figure 34. Marquee Assembly Exploded View (42" Cabinet)

Marquee Florescent Light Service (32" Cabinet)

The Marquee is lighted by one florescent fixture.

1. To gain access to the fixture, remove the eight (8) Torx screws that secure the marquee artwork and clear plastic in place.
2. Replace the florescent tube with another 18" florescent tube.
3. To remove the fixture, disconnect the cabinet from AC power and perform the steps that follow.
4. Disconnect the AC power cord from the fixture.
5. Remove the two Phillips screws that secure the fixture to the cabinet and remove the fixture.
6. Reverse these steps to install the new fixture. Replace the fixture only with a comparable unit from GLOBAL VR.

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Cold-Cathode Florescent Light Service

Cold-Cathode Florescent Lights (CCFLs) are used to add dramatic lighting effects to the cabinet. See Figure 35 for CCFL assembly details. Each CCFL set is made up of two light tubes and a power inverter. The power inverter is connected to +12 VDC power. If both of the lights in a set fail, the problem is most likely a faulty power inverter or loose power connection. Make sure the power connector is firmly attached to the power inverter. Swap the power inverter with a known good inverter as a test before changing the light tubes.

Some CCFL light sets have power switches. If you replace an inverter, and the replacement set has a power switch, make sure it is switched **ON**. Install the inverter so that the vent holes (the circle of small holes on the case) are not covered.

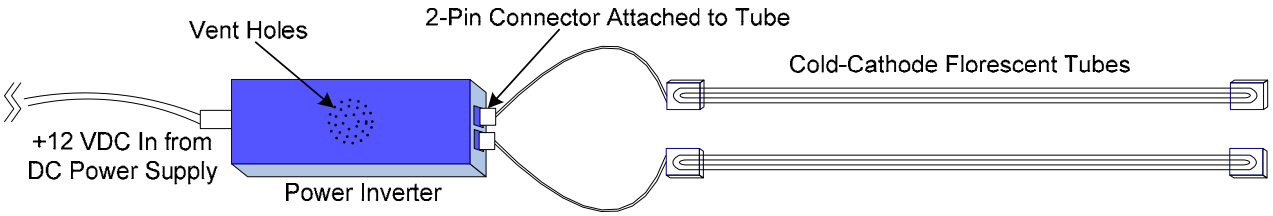

Figure 35. Cold-Cathode Light Detail

Control Panel CCFLs

The control panel is lit by a set of 12" white CCFLs. To access the power inverter, remove the Electronics Access Panel. If you need to replace the CCFLs, you will need to remove and disassemble the control panel assembly as described on page 39.

Floor CCFLs Under Seat Pedestal

Note: The power inverter for these lights is located inside the seat pedestal. If the lights are not working, the problem is most likely to be with the inverter.

Note: See the *Mini-Motion Base Service & Repair Manual* to replace the CCFLs at the back of the Mini-Motion base.

Remove the four (4) bolts that secure the seat assembly to the cabinet and slide the seat assembly away from the cabinet. Turn the seat assembly on its side to access the lights and the power inverter.

WARNING: When lifting the back of the 42" Cabinet, make sure it is securely braced to prevent injury or damage.

CCFLs Below Control Panel

1. Remove the Electronics Access Panel and disconnect the two light tubes from the inverter.
   - Remove the two (2) Torx screws that secure the clear plastic housing in place under the control panel and remove the housing with the light tubes.
   - Reverse these steps to re-install the housing and light tubes.

Leader Light or Speaker Lights Service (42" Cabinet)

The cabinet uses red LED light tubes for the Leader Light, and to add a red glow around the front speakers. All three of these lights are located inside the marquee. Refer to Figure 34 for an exploded view of the marquee assembly, and do the following to change an LED light tube:

1. Remove the ten (10) Torx screws that secure the marquee artwork and clear plastic in place. Carefully tilt the clear plastic piece outward enough to disconnect the leader light connector, and then remove the clear plastic with the Leader Light Assembly and artwork.
2. To replace the leader light, remove the four (4) Torx screws that secure the Leader Light Assembly in place and then snip the cable ties that secure the light tube to the assembly.
3. To replace a speaker light, disconnect the light tube power connector and then snip the cable ties that secure the light tube in place
4. Reverse these steps to install the new light tube.

Leader Light Replacement (32" Cabinet)

1. Remove the four (4) Torx screws that secure the Leader Light grill in place and remove the grill.
2. Snip the cable ties that secure the LED light tube to the cabinet.
3. Disconnect the power connector and remove the light from the cabinet.
4. Reverse these steps to install the new Leader Light.

LED Brake Light Replacement

Note: The light on the back of the Mini-Motion Base is a CCFL. See the *Mini-Motion Base Service & Repair Manual* for the replacement procedure.

1. Remove the six (6) Torx bolts that secure the seat pedestal cover plate to the wooden pedestal (see Figure 24 on page 46).
2. Carefully lift the seat assembly and place it on its side. Be careful not to pull the speaker wires that run from the pedestal into the seat. You may need to reach inside the pedestal and snip wire ties to create slack in the wires.
3. Disconnect the power connector from the LED light tube and snip the cable ties that secure the light tube to the seat pedestal.
4. Reverse these steps to install the new LED light tube. Make sure the LEDs in the light tube line up with the holes in the pedestal cover.

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Setting the Date and Time

Note: The date and time are not displayed on any gameplay screens, but are shown in the Operator menus, including collections screens.

Important: Be careful not to change any other settings in the System Setup Utility menu.

1. Connect a keyboard to the system computer and power cycle the game. Press the **F2** key during boot to run Setup. The System Setup Utility Main Menu will appear.
2. Use the up and down arrow keys (↑↓) to select **System Date** on the menu screen. The month will be highlighted.
3. Use the **+** and **–** keys to set the month. Press the **Tab** key to move to the day, and set it the same way. Repeat for the year.
4. Use the up and down arrow keys (↑↓) to select **System Time**, and then use the **+, –,** and **Tab** keys to set the time the same way you set the date.
5. When finished, press **F10** on the keyboard. The following prompt will appear:

6. Make sure **Yes** is selected (use the arrow keys to select if necessary) and press **Enter**.

Setting the Computer BIOS (CMOS)

This procedure applies only to systems with the Intel DG41TY Motherboard. If your system has a different motherboard, check **http://service.globalvr.com** for updated information.

If you are comfortable using the CMOS Setup Utility, connect a keyboard to the computer and press the **F2** key during boot to run the Utility, select **Load Optimal Defaults** from the Main Menu, and then change the settings shown in the table below. For more help, refer to the detailed instructions that follow.

Menu	Submenu (If Applicable)	Item	Setting
Exit		Load Optimal Defaults	
Main		System Date	Set to Current Date
		System Time	Set to Local Time
Advanced	Boot Configuration	CPU Fan Control	Disable
		System Fan Control	Disable
		Display F10 to Enter Boot Menu	Disable
	Floppy Configuration	Diskette Controller	Disabled
Power		After Power Failure	Power On
		Processor Power Management	Disable
Boot		Boot Device Priority	CD/DVD-ROM drive Hard Disk Drive Floppy Drive Ethernet
		Boot to Network	Disable

Important: Your screens may not look exactly like the screens shown in this document, and some settings shown on the screens pictures may be different from your system.
Do not change any settings that are not specifically described in this document.

Note: Use the left and right arrow keys (→←) to move between the menus listed at the top of the screen, and the up and down arrow keys (↑↓) to move up and down between menu items. Use the + and – keys to change settings for selected items.

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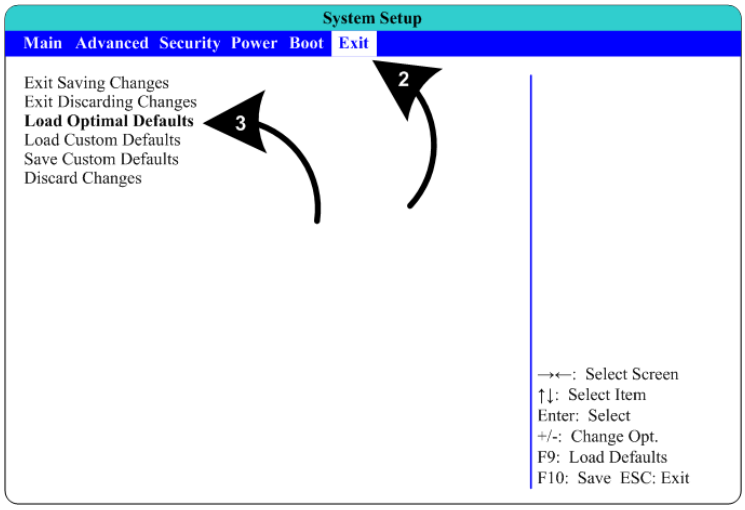
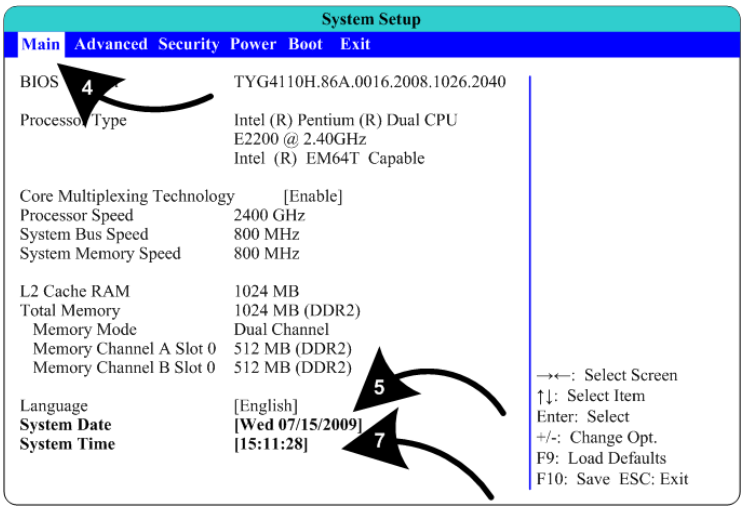
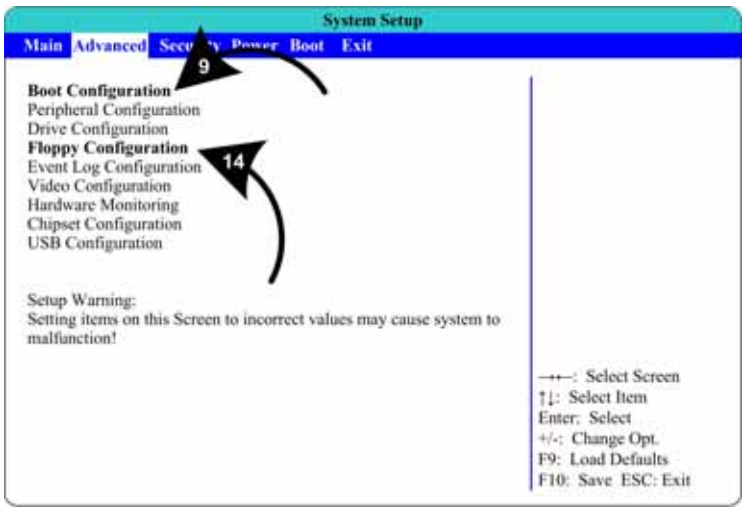
1. Press the **F2** key during boot. The System Setup Utility Main Menu will appear.
2. Use the left and right arrow keys (→←) to select the **Exit** menu.
3. Use the up and down arrow keys (↑↓) to select **Load Optimal Defaults**, and press **Enter**. A confirmation box will appear. With **Yes** selected, press **Enter**.



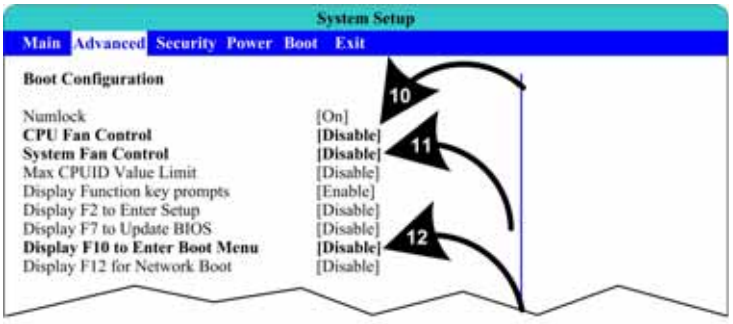
4. Use the left and right arrow keys (→←) to select the **Main** menu.
5. Use the up and down arrow keys (↑↓) to select **System Date**. The month will be highlighted.
6. Use the **+** and **–** keys to set the month. Press the **Tab** key to move to the day, and set it the same way. Repeat for the year.
7. Use the up and down arrow keys (↑↓) to select **System Time**, and then use the **+, –,** and **Tab** keys to set the time the same way you set the date.

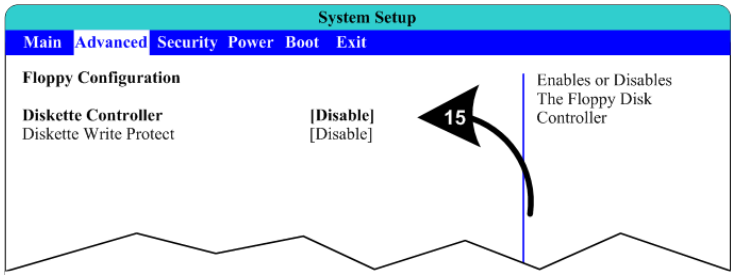


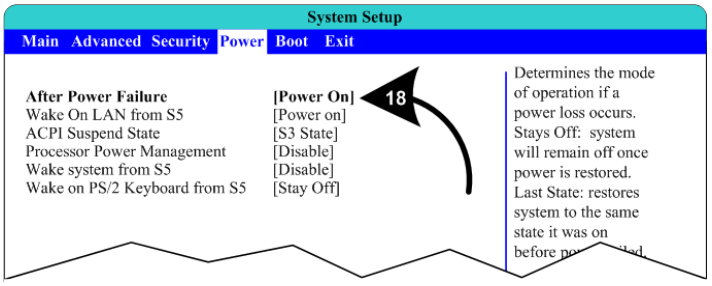
8. Use the left and right arrow keys (→←) to select the **Advanced** menu.
9. Use the up and down arrow keys (↑↓) to select **Boot Configuration,** and press **Enter**. The **Boot Configuration** menu will appear.



10. Use the up and down arrow keys (↑↓) to select **CPU Fan Control**, and then use the (+-) keys to change the setting to **Disable**.
11. Use the up and down arrow keys (↑↓) to select **System Fan Control**, and then use the (+-) keys to change the setting to **Disable**.
12. Use the up and down arrow keys (↑↓) to select **Display F10 to Enter Boot Menu**, and then use the (+-) keys to change the setting to **Disable**.
13. Press the **Esc** key to exit back to the **Advanced** menu.
14. Use the up and down arrow keys (↑↓) to select **Floppy Configuration,** and press **Enter**.
15. Follow the same steps as before to select **Diskette Controller** and change the setting to **Disable**.
16. Press the **Esc** key to exit back to the **Advanced** menu.
17. Use the left and right arrow keys (→←) to select the **Power** menu.
18. Use the up and down arrow keys (↑↓) to select **After Power Failure,** and then use the (+-) keys to change the setting to **Power On**.






System Setup
Main Advanced Security Power Boot Exit
After Power Failure [Power On]
Wake On LAN from S5 [Power on]
ACPI Suspend State [S3 State]
Processor Power Management [Disable]
Wake system from S5 [Disable]
Wake on PS/2 Keyboard from S5 [Stay Off]
18
Determines the mode of operation if a power loss occurs. Stays Off: system will remain off once power is restored. Last State: restores system to the same state it was on

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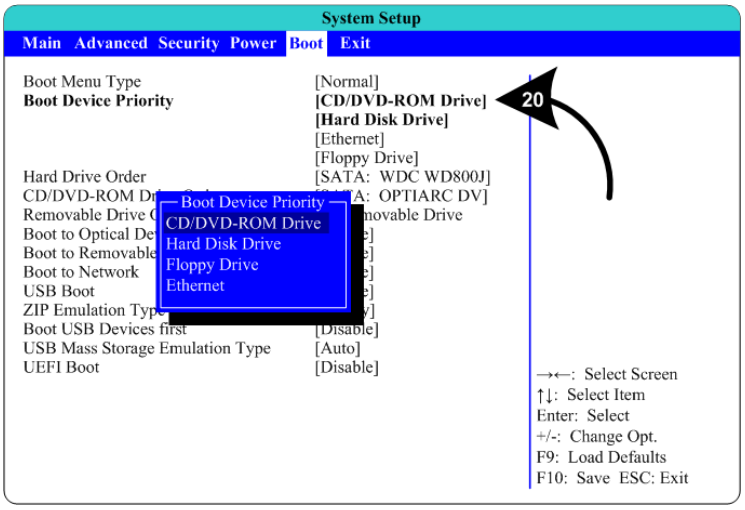
19. Use the left and right arrow keys (→←) to select the **Boot** menu.
20. Use the up and down arrow keys (↑↓) to select **Boot Device Priority,** and press **Enter**.
21. A pop-up window will appear listing available drives. Use the up and down arrow keys (↑↓) to select **CD/DVD-ROM Drive**, and then use the (+-) keys to move the drive to the top of the list.
22. Use the up and down arrow keys (↑↓) to select **Hard Disk Drive**, and then use the (+-) keys to move the drive to the second position. Press **Enter**.
23. Use the up and down arrow keys (↑↓) to select **Boot to Network,** and then use the (+-) keys to change the setting to **Disable**.



24. Now that all settings are correct, press **F10**. The following prompt will appear:

25. Make sure **Yes** is selected (use the arrow keys to select if necessary) and press **Enter**.

Chapter 6 — Troubleshooting

Video Troubleshooting

Problem	Cause	Possible Solution
No picture or Corrupted picture on monitor You hear the audio	Power problem	Check the Power On LED on the monitor power supply. Make sure the power cord is connected to the power strip and the power strip is on.
	Loose or faulty DVI video cable	Verify that the video cable is firmly connected from the monitor to the video card in the computer. While the monitor is powered ON, disconnect the video cable. You should briefly see a message on-screen saying *No Input Signal* if the monitor is working. Check the video cable and make sure it is not pinched or frayed (also, cables can go bad over time). Connect the cable to a different monitor to verify video output.
	Loose or faulty connections between LCD Panel and Control PCB	Make sure that all harnesses between the control PCB and LCD panel are connected properly. Check the DVI video cable and power connection. Make sure the LCD Control PCB connector is properly connected and not cracked or broken (see Figure 30 on page 53). If you hear Alert beeps from the System PC, contact Technical Support for assistance.
	Loose or faulty video card	When the computer boots up, it performs a PC self-diagnostic test. If you hear 3 beeps from the computer, this indicates a problem with the video card. If the video card is faulty, contact Technical Support. If instructed by Technical Support, open the computer and check the following: • Make sure the video card is seated properly in the motherboard. Reseat the video card. • Check the power connector to the video card inside the computer. Make sure it is connected properly and is not connected backwards. • Power on the computer and make sure the fan on the video card is spinning fast.
Picture is dim or faded	Gamma and/or Vibrance needs adjustment	Adjust the monitor Gamma and/or Vibrance setting from the Operator Menu **Diagnostics** screens (see page 34). If this does not give adequate results, increase brightness using the monitor remote control board mounted to the back of the monitor.
Red or green horizontal lines on screen	Faulty LCD control PCB	Contact Technical Support for assistance.
Green or magenta pixels on screen	Loose or faulty DVI cable	Check the DVI cable between Monitor and System Computer.

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Problem	Cause	Possible Solution
No video and no audio **Note:** It takes about 3 minutes to boot and start the game.	PC power switch is off	If the computer does not power on, make sure the On/Off switch on the back of the computer is in the **On** (**I**) position.
	BIOS setting has changed	Check the BIOS settings (see page 63). Make sure *After Power Failure* is set to *Power On*.
	No power to computer	Verify the computer is ON by the LED on the front of the computer. Verify the line voltage switch on the back of the computer is set to 115V. Make sure the AC power cord is firmly connected to the computer and the power strip, and the power strip LED is on. Turn off the power strip, wait 20 seconds, and then turn it back on to reboot the computer. If you have checked all power connections, and the fan in the computer power supply does not come on, the computer power supply may be bad.
	Corrupted software or Faulty hard drive	Restore the software (see page 36). If you continue to have problems, you may have a faulty hard drive. Contact Technical Support.

Audio Troubleshooting

Problem	Cause	Possible Solution
No audio	Volume set too low	Use the **VOL UP** button on the Operator Button Panel to raise the volume. Check audio settings in the Operator Menu **Machine Settings: Settings** menu, and verify that the Master Volume is set high enough. Verify the volume pots are not turned all the way down on the Audio Amp PCB (see Figure 25 on page 47).
	Faulty wiring	Turn off the game. Verify that all the wires are firmly connected to the speakers and Audio Amp PCB. Verify that each wire is connected to the correct port. Verify that no wires are frayed or improperly shorting to ground. (See *Audio Amp and Speakers Service* on page 47.)
	Blown speakers	Remove the grills and inspect each speaker for visible damage. Run **Diagnostics: Sound Test** from the Operator Menu to verify each speaker is working.
	Faulty audio amp PCB	To verify audio is working at the computer, connect stereo headphones to each computer audio port. Test the Audio Amp PCB in another cabinet.
Audio hum	Fault in AC Wiring	A constant low hum in the speakers can be caused by a ground loop, or reversed AC line and neutral wires to a component such as a power supply.

Problem	Cause	Possible Solution
Poor sound from one or more speakers	Blown speakers	Remove the grills and inspect each speaker for visible damage. Run **Diagnostics: Sound Test** from the Operator Menu to verify each speaker is working.
	Reversed wires	A weak or low muffled sound is a sign of reversed speaker wires. Check for reversed wires on each speaker. (See *Audio Amp and Speakers Service* on page 47.)
	Faulty audio amp PCB	To verify audio is working at the computer, connect stereo headphones to each computer audio port. Test the Audio Amp PCB in another working cabinet.
	Faulty wiring	Turn off the game. Verify that all the wires are firmly connected to the speakers and Audio Amp PCB. Verify that each wire is connected to the correct port. Verify that no wires are frayed or improperly shorting to ground. (See *Audio Amp and Speakers Service* on page 47.)

Control Troubleshooting

Problem	Cause	Possible Solution
Buttons and coin mechs do not work	Faulty micro switch	Replace the micro switch on the button and re-test.
	Faulty wiring	Disconnect the cabinet from AC power. Verify that all wires are firmly connected to each button and the GVRI/O Mini PCB. Verify that the wires are connected to the correct spades on the button micro switch (see Figure 22 on page 44). Verify that no wires are frayed or improperly shorting to ground. Check for broken wires at cable-tie points.
	Faulty GVRI/O Mini PCB	Make sure that all connections to the PCB are firm. Replace PCB if faulty (see page 45).
Steering pulls to one side	Faulty Force-Feedback PCB	Verify that the force-feedback PCB is getting +24 VDC power. Test the PCB in a working cabinet.
	Faulty motor	Test the steering motor in a working cabinet.
	Faulty 24 VDC power supply	Use a volt meter to verify that the force-feedback power supply is putting out +24 VDC.
	Pot wires reversed	Check the wires between the steering pot and Force Feedback PCB.
Sloppy or poor steering	Poor calibration	Calibrate the steering from **Diagnostics: Play Control Test** in the Operator Menu (see page 31).
	Faulty 5 KΩ steering pot	Test calibration from **Diagnostics: Play Control Test** in the Operator Menu. Replace pot if faulty (see page 31).
	Loose set screw	Check the set screws in the steering assembly.
	Loose drive belt	Adjust belt tension (see page 42).
	Loose or worn drive belt or motor gear	Turn off the cabinet. Open the driving control panel and inspect the belt and gears on the steering motor (see page 41).

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Problem	Cause	Possible Solution
	Faulty Force-Feedback PCB	Verify that the PCB is getting +24 VDC power. Test the PCB in a working cabinet. Calibrate the steering from **Diagnostics: Play Control Test** in the Operator Menu.
Steering does not auto-calibrate	Faulty USB cable or PCI USB card	Test by connecting to a motherboard USB port. You may need to reboot twice for Windows to find the device. Also try a new USB cable. After testing, re-connect to a PCI USB port to minimize the risk of intermittent steering loss due to static shock (again, reboot twice).
	Faulty Force-Feedback PCB	Verify that the PCB is getting +24 VDC power. Test the PCB in a working cabinet.
Steering wheel shakes	Faulty 5 KΩ steering pot	Test pot for smooth resistance. If you replace the pot, be sure to calibrate it from **Diagnostics: Play Control Test** in the Operator Menu (see page 31).
Steering stops working (Intermittent)	Force-Feedback PCB connected to wrong USB port	To minimize the risk static shock, the force-feedback PCB should be connected to a PCI USB port, **not** to a motherboard USB port. Static shock can cause intermittent steering feedback failure. See Figure 41 on page 84 for a diagram of the computer ports.
No force-feedback in the steering	Belt is broken	Replace belt (see page 41).
	Motor gear is worn	Inspect the motor gear and replace if worn.
	Faulty motor	Test the steering motor in a working cabinet.
	Faulty 24 VDC power supply	Use a voltmeter to verify that the power supply is putting out +24 VDC.
	Steering motor not properly grounded	Make sure the steering motor frame is properly grounded to help minimize the risk of static shock.
	Faulty Force-Feedback PCB	Verify that the PCB is getting +24 VDC power. Test the PCB in a working cabinet.
	Force-Feedback PCB connected to wrong USB port	To minimize the risk static shock, the force-feedback PCB should be connected to a PCI USB port, **not** to a motherboard USB port. Static shock can cause intermittent steering feedback failure. See Figure 41 on page 84 for a diagram of the computer ports.
Gas or brake does not work properly **Note:** Low value of 0 or high value of 255 on **Diagnostics: Play Control Test** indicates problem with pot wiring.	Pot is out of calibration	Calibrate the pedals from **Diagnostics: Play Control Test** in the Operator Menu (see page 31). If you replace a pot or the computer, always recalibrate the pedals. (Pedals **do not** auto-calibrate when you reboot the game.)
	Faulty 5 KΩ pot	Test the pot for smooth resistance. If you replace the pot, be sure to calibrate the pedals from **Diagnostics: Play Control Test** in the Operator Menu (see page 31).
	Loose set screw	A loose set screw can cause the pedal to work only on a partial range of its motion. Tighten the set screw.
Feels like brake is on during game	Dead spot in the brake pot	Test the brake pot and replace if bad. See page 43.

Cabinet Linking Troubleshooting

The following issues can prevent the cabinets from linking:

Cause	Possible Solution
Faulty wiring	Verify that a CAT-5 or better Ethernet cable is connected between the Ethernet port on the AC Power Plate and the computer. (CAT-5 cables have 8 wires.) While the cabinet is powered on and connected to another cabinet, verify the green LED on the Ethernet card is lit. If you are using an Ethernet hub or switch, verify green LEDs on the hub or switch light for each Ethernet port that is connected.
Cross-over coupler not used or used improperly	To link two cabinets, connect an Ethernet cable to the Ethernet port on the power plate of each cabinet. If you use a cross-over coupler make sure it is Gigabit compliant. **Do not** use a cross-over coupler with a hub or switch.
Cross-over coupler is not Gigabit compliant	All components used to link cabinets must be Gigabit (10/100/1000 Mbps) compliant. Couplers shipped with older cabinets are not Gigabit compliant.
Faulty Ethernet hub or switch	Verify the LEDs on the Ethernet hub or switch are lit for each port used. If possible, verify the hub or switch is working by connecting it to a known working computer network or set of linked cabinets.
Hub or switch is not 10/100/1000 Mbps	Use a 10/100/1000 Mbps (Gigabit) hub or switch to link three or four cabinets.
Duplicate Link ID numbers	A cabinet with a duplicate Link ID number will display the *Select A Link ID* menu. You can also check or change the Link ID from the Operator menu **Machine Settings: Settings** screen. Each cabinet in a linked group must have a unique Link ID number.
Mixed Software Comm Versions	Verify that all cabinets are running the same Comm Version, shown in **Machine Settings: Info** screen. Install software as needed so all games have the same software version.

Miscellaneous Troubleshooting

Problem	Cause	Possible Solution
No power	Power strip not plugged in or turned off	Make sure the power strip ON/OFF switch is ON, and the light on the power strip is on. If the light is off, make sure the connections to the AC power plate and power transformer terminals are secure.
	Cabinet not connected or turned off	Make sure the AC power cord is firmly connected to the power plate and an active AC outlet, and the cabinet ON/OFF switch is ON.
Game Dongle not found by system computer	Game Dongle not connected	Make sure the Game Dongle is securely connected. Power the cabinet off and then on.
	Faulty Game Dongle	Make sure the dongle is connected properly. It will light-up red when recognized by the computer.) Contact Tech Support to exchange a faulty dongle.
	Faulty USB port	Test the dongle in a different USB port.
Cabinet gets very warm	Faulty ventilation fan	Verify that the ventilation fan is working. It is located above the monitor access door on the back of the cabinet. Replace the fan if it is worn or spinning slowly.
	Cabinet ventilation holes are blocked	Make sure you have proper clearance between the cabinet rear and the wall. Make sure the vent holes are clear of dust and debris and that air is freely blowing out of the cabinet.

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Problem	Cause	Possible Solution
Marquee lamp does not light or is intermittent	Faulty florescent tube	Check the florescent tube for darkened or cracked end. Replace the florescent tube if it looks worn.
	Faulty florescent fixture	Verify the florescent tube pins make a good connection with the lamp fixture. Check the ballast for proper operation. Replace fixture if faulty.
	Faulty wiring	Check the AC power connection to the fixture.
Wrong Date or Time in Menus	Date or time needs to be set	Refer to *Setting the Date and Time* on page 62.
Game will not accept coins	Faulty coin mech	Verify the coin mech is not jammed and is properly aligned and latched to the coin door.
	Faulty ground wire	Check the ground wire to the coin door.
	Faulty GVRI/O Mini PCB	Check the connection to the J8 on the PCB, and the USB cable. Test with known good PCB. Replace PCB if faulty (see page 45).
	Faulty wiring	Disconnect cabinet power cord. Check all coin mech wiring. Verify no wires are frayed or shorting to ground.
Wrong number of credits shown	Incorrect setting	Adjust settings from the Operator Menu.
	Faulty wiring	Disconnect cabinet power cord. Check all coin mech wiring. Verify no wires are frayed or shorting to ground.
Optional DBA not working	Incorrect dipswitch setting	Set dipswitches for Long Pulse or Gaming (***not*** Short Pulse or Vending).
Very long wait before System Recovery Disk runs	Diskette Controller is enabled in the BIOS Settings	Check the BIOS settings (see page 63). Select Floppy Configuration from the Advanced menu and set Diskette Controller to Disable.

Error Message Screens

The messages below may appear at boot if the software detects a hardware problem.

Boot Error Message	Explanation and Solution
Dongle Missing or Invalid	Make sure the USB Game Dongle is firmly connected.
Invalid Dongle: Incorrect Game Version	Dongle does not match game version. If you upgrade the software, be sure you connect the corresponding Game Dongle.
There is a CD in the Drive	Eject the disk from the drive. Press the **START** button to continue to boot the game.
Error Detected with GVRIO Board	The GVRI/O Mini PCB is either disconnected or malfunctioning, or the USB port or cable is faulty. Check all connections to the PCB. Test in a different USB port and with a different USB cable. Replace the PCB if faulty.
Incorrect GVRIO Board	The screen will display the revision numbers of the GVRI/O Mini PCB installed, and the one required. Contact your distributor to order the correct GVRI/O Mini PCB.
Select a Link ID (Screen appears if a duplicate Link ID is detected)	The cabinet has the same Link ID as another cabinet. Turn the wheel to select a different Link ID from the screen and press **START**. Number the cabinets in sequence from left to right.

Boot Error Message	Explanation and Solution
Steering Auto Calibration failed. Please turn the wheel all the way left and all the way right	The software detected a problem with steering. Once you turn the wheel, the software will determine whether the problem is with the steering pot or the force-feedback. If the problem is with the force feedback, you will be given the option to start the system without force feedback. If the steering pot is not working, the game cannot be started. See page 40 for steering service.
Motion Hardware Not Found	The software is not detecting the Motion PCB. Check all cables to the Electronics Box in the Mini-Motion base. If this message appears on a non-motion cabinet it probably has a Motion Dongle installed.
Error Detected with Motion System	The Motion PCB is returning an error code. Contact Technical Support.
Attract Mode Error Messages	**Explanation and Solution**
A **Red Dot** appears in the lower right corner of the Attract Screen	Indicates hardware error, usually with a button, gas or brake pot, or steering. Explanation is displayed on **Machine Settings: Info** screen in Operator Menu.
A **Blue Dot** appears in the lower right corner of the Attract Screen	Indicates Cabinet Mismatch error in linked cabinets. Explanation is displayed on **Machine Settings: Info** screen. The following conditions will cause a Blue Dot error message: • **Winner Gets Free Game** not set the same on all cabinets • **Free Game Min Players** not set the same on all cabinets • **Race Length** not set the same on all cabinets • Duplicate Cabinet Link ID • Different Software Comm Version on one or more cabinets • Different Tracks Disabled • Different Region (Set by Game Dongle)

Mini-Motion Base Troubleshooting

Refer to the *Mini-Motion Base Service & Repair Manual* for service procedures.

Problem	Cause	Possible Solution
Motion Platform is not level during Attract Mode	Motor and Pot are not calibrated	Test the motor and calibrate if needed, as described in the *Mini-Motion Base Service & Repair Manual*.
No power to the Mini-Motion Base (Lighting at back of base and cooling fan remain on as they are powered by the DC power supply in the display cabinet.)	Base is not plugged in	Check the AC power cords from the wall outlets to the Display Cabinet, and the Display Cabinet to the Mini-Motion Base.
	Tripped Breaker on AC Power Plate	Check the Breaker on the power plate at the rear of the Display Cabinet.
	Blown Fuse on Electronics Box	Check the fuse on the Electronics Box. Replace with 7 Amp fuse if blown.
	Tripped Breaker for AC Wall Outlet	Check the Breaker Switch for the AC Wall Outlet.
	No voltage output from the Transformer	Check the Transformer input and output voltage. Input voltage should be ~115 VAC. Output voltage should be ~230 VAC.
Motor is not responding There IS 230 VAC power to the Electronics Box	Motion STOP Button is pushed in	Pull out the Motion STOP Button.
	Motion STOP Button cable faulty or not connected properly	Check the cable connections to the Motion STOP Button and Electronics Box.

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Problem	Cause	Possible Solution
	Motion STOP Button is faulty	Check continuity across the Motion STOP Button.
	Loose or faulty USB cable	Check the USB cable between the computer and Electronics Box
	Loose or faulty motor cable	Check cable from Electronics Box to Motor.
	Faulty component in Electronics Box	Contact Technical Support for assistance.
	Faulty Motor	Check to see if the Motor Shaft will rotate by hand (with no power to the Motor). If it will not, your Motor is faulty. If it will rotate, check the Motor Cable.
Mini-Motion Base moves during Attract Mode	Faulty Pot	Disconnect the Mini-Motion Base AC Power Cord Immediately. (You can continue to use the game without motion, if desired.) Replace the pot as described in the *Mini-Motion Base Service & Repair Manual*.
Motor cannot find home position or Motor appears to move out of control	Faulty Pot	Disconnect the Mini-Motion Base AC Power Cord Immediately. (You can continue to use the game without motion, if desired.) Replace the pot as described in the *Mini-Motion Base Service & Repair Manual*.
	Pot wired wrong	Check the pot wiring.
	Disconnected or faulty USB Cable	The motor will keep moving if it does not receive a signal from the System Computer.
Game is turned off but Mini-Motion Base keeps moving	Mini-Motion Base is not powered off	Turn off BOTH power switches on the back of the display cabinet. If you turn off the display cabinet power but leave the motion base power switch on, the game will continue to move while the PCB waits for a signal from the System Computer.
12 VDC Ventilation Fan is NOT working	Loose or faulty wiring	Make sure the Fan Power Harness is securely connected.
	Faulty Fan	Replace a faulty fan immediately.
Fan in Electronics Box is NOT working Motor is functional	Problem is inside Electronics Box	Contact Technical Support. **Do not open** the Electronics Box. Disconnect the Mini-Motion Base AC Power Cord Immediately to prevent damage to components in the Electronics Box. (You can continue to use the game without motion, if desired.)
Error message: Motion Hardware Not Found	Software is not detecting Motion PCB	Check all cables to the Electronics Box in the Mini-Motion base.
Error message: Error Detected with Motion System	Motion PCB is returning an error code	Contact Technical Support for assistance.
Push In for Motion message appears	Mini-Motion Base is overloaded	Push in the Motion STOP Button and then pull it out again. If a heavy load was on the seat for an extensive time, the electronics box may shut down motion until components cool to prevent damage.

Chapter 7 — Replacement Parts

If you need replacement parts, please reference these part numbers when contacting GLOBAL VR® technical support or your distributor. For help identifying parts, download the Assembly Drawings from **http://service.globalvr.com/twisted.asp**.

Selected parts can be purchased online at **http://parts.globalvr.com**.

Notes: Parts are for all cabinets configurations except as noted. Parts noted as *42" Only* are for both the 42" Deluxe (non-motion) and Mini-Motion cabinets.
Part numbers may change due to hardware or software revisions.
Qty column shows quantity used per cabinet.

See Page 78 for Mini-Motion Base Replacement Parts.

Documents and Software

Item Number	Qty	Description
040-0224-01	1	Operation & Service Manual
040-0225-01	1	Software Restore Guide
040-0226-01	1	Mini-Motion Base Service & Repair Manual (Mini-Motion Only)
050-0177-01	1	System Recovery Disk (1 CD)
050-0188-01	1	Game Install Disk (1 DVD)

Cables

Item Number	Qty	Description
115-0005-02	1	Steering to Immersion PCB, Rev. D
115-0006-01	1	Motor to Motor Amp Rev B
115-0007-01	1	+24VDC to Motor Amp Rev C
115-0008-01	3	110VAC to +24VDC Supply Rev C
115-0025-01	1	110 VAC Fan, Grill & Cord Assembly Rev A
115-0049-01	1	Power Plate Ground Cable 3.5" Long Rev A
115-0119-01	2	Speaker Connectors (42" Only)
115-0145-01	1	Audio Amp to Seat Harness
115-0146-01	1	GVRI/O, Power, USB Main Harness
115-0150-01	1	Leader Light, Start Lamp, Coin Meter Harness (42" Only)
115-0151-01	1	Power, +12/+5 VDC (42" Only)
115-0152-01	1	Coin Door & Service Buttons
115-0153-01	1	Floor Light Power Harness
115-0154-01	1	AC Power Cable, Dual Marquee Lights (42" Only)
115-0155-01	1	Front Speaker Cable (42" Cabinet Only)
115-0157-01	2	Marquee Florescent Light Assembly AC In
115-0161-01	1	AC Power Cord, Marquee Light (32" Only)
115-0167-01	1	Ground, Brake Pedal
115-0168-01	1	Transformer, Complete Harness Assembly
115-0201-01	1	Marquee, Audio & Leader Light (32" Only)
115-0202-01	1	AC Power, Marquee Light Extension (32" Only)
115-0203-01	1	Coin Meter, Start Lamp, Leader Light Harness (32" Only)
115-0204-01	1	Brake Light Cable (Non-Motion Only)
115-0205-01	1	Seat Lighting DC Power Cable
115-0208-01	1	Control Panel Harness
115-0215-01	1	Marquee, Front Speaker, Leader Light (32" Only)
115-9635-01 REV A	1	Ethernet Cable, CAT 5, 10 Ft Long
115-DVINPUT-CBL	1	Digital Video Input Cable (DVI) to LCD Monitor
80-0213-00	1	Power Cord 6', SJT UL Recognized
96-0539-00	3	Audio Cable, Stereo 3.5 mm 6'

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Item Number	Qty	Description
TRD855BL-5	1	RJ-45 CAT 5e Patch Cable, 5 Feet Long
USB-AB06MM	1 or 2	USB Cable 6', USB2-AB06 (Non-Motion uses 1, Mini-Motion uses 2)
CBL-0705-X	1	AC Power Cable with Round Metallic Plug (Mini-Motion Only)

General Hardware

Part Number	Qty	Description
Electronics (Including Power)		
(Purchase Locally)	1	Power Plate Fuse, 6A, Slo Blo, 5mm X 20mm
990-0014-CBN	1	GVRIO Mini PCB
S-150-24	1	Power Supply, Mean Well, for LCD Monitor
44-1100-01	1	Power Supply, 5V/12V 115 W
45082-00	1	PC Assembly
49-0963-40	1	7 Outlet Surge Protected Power Strip
2-30-2434	1	Transformer, 115-230V, 500W
CCM1600-ND	1	Power Entry Module, EMI Filter, PNL MNT, Un-Shield
USB-KQRTG-HL-TWIST	1	Game Dongle & Code, Motion (Mini-Motion Cabinets Only, Exchange Only)
USB-KQRTG-HL-TWIST-NON-MO	1	Game Dongle & Code, Non-Motion (Non-Motion Cabinets Only, Exchange Only)
37201-00	1	AC Power Plate (Non-Motion Only)
37327-00	1	AC Power Plate (Mini-Motion Only)
HW-63CBE	1	Power Breaker, 30 A, 125/250 VAC (Mini-Motion Only)
LCD Monitor Assembly		
FCB-AOD-AWX5-SS32	1	Flora Digital for Samsung 32" LCD (32" Only)
FCB-AOD-AWX7-LG10	1	42" LCD Driver Board (42" Only)
LC420WX7-SLA1	1	42" LCD DISPLAY (42" Only)
LTA320WT-L06	1	LCD, 32", Panel Only (32" Only)
26126-00	1	Glass Display Shield, 42" LCD (42" Only)
26138-00	1	Glass Display Shield, 32" LCD (32" Only)
37121-00	1	Bezel, Front LCD, 32" (32" Only)
37126-00	2	Bracket, 32" LCD Mount (32" Only)
37153-00	1	Housing, LCD 42 Inch (42" Only)
37154-00	1	Bezel, Front, LCD 42 Inch (42" Only)
37169-00	1	LCD Rear Housing (32" Only)
37191-00	1	Cover, LCD Base (42" Only)
37192-00	2	Bracket, 42" LCD Cabinet Mount (42" Only)
37202-00	1	Cover-Emissions, 42" LCD (42" Only)
37216-00	4	Mount, 42" LCD (42" Only)
Driving Controls		
50-2978-30	1	Assembly Dual Pedal W/Chrome Perforated Pedals
59-6004-800H1628	1	START Button Assembly
59-6004-855H1625	1	View Button Assembly
59-6004-855H1626	1	Music Button Assembly
59-6004-855H1648	1	Look Back Button Assembly
75-0006-822H2774		BOOST Button Assembly
990-0040-01	1	Single PCB Steering Board, Immersion
50-0102-14	1	Steering Mechanism Assembly W/Motor-Wheel-Cover

Part Number	Qty	Description
Lighting		
49-1001-00	1 or 2	Fluorescent Light 18" (32" uses 1, 42" uses 2)
60017-00	1	CCFL Deflector, Floor Lights (Non-Motion Only)
26146-00	1	Housing, Molded, CCFL Light Cover
37199-00	1	Grill, Marquee Leader Light (42" Only)
CCFL2R	1 or 2	Red CCFL Kit (Non-Motion uses 1, Mini-Motion uses 2)
CCFL2W	1	White CCFL Kit, Dual 12"
METL6R	1	LED Light Tube, Red, 6.13", 12VDC
METL14R	1	Red LED Light Tube, 14" (Non-Motion Only)
60075-00	1	Reflector, Leader Light
Audio		
50-9005-00	1	Speaker, 5 In, 12 Watt, 8 Ohm, Shielded, Happ (32" uses 3, 42" uses 1)
50-9986-00	1	5.25" Box Speakers, Pair, 4 Ohm, 150w (42" Only)
990-0001-01	1	5.1 Audio Amp Board Populated Rev C
01-0045-LBH	1	Grill-4" Speaker
37214-00	1	Grill, Leader Light (32" Only)
Miscellaneous		
2569K24	1	Convoluted Sleeving, 18" Long, 3/8" ID
26001-YEL	1	Marquee Housing - Yellow (32" Only)
26015-00	1	Marquee Clear Plastic (32" Only)
26134-00-YEL	1	Rear Seat Housing, Yellow
26139-00	1	Marquee Clear Plastic (42" Only)
26161-00	1	Dash Board, Silver
26162-00	1	Floor Mat, Black
26169-00	1	Clear Plastic, Pedestal Base
28A2024-0A0	3	Ferrite Bead, Snap On
37021-00	1	Seat Panel Base (Non-Motion Only)
37032-00	2	Marquee Grill (32" Only)
37040-00	2	Beam Pedestal Support (Non-Motion Only)
37106-00	2	Speaker Box Mount (42" Only)
37193-00	1	Weldment, Marquee (42" Only)
37194-00	4	Bracket, Quarter Panel
37249-00	1	Bracket, Coin Door, Midwidth
37252-00	1	Bracket, Seat Wrap (Non-Motion Only)
37253-00	1	Sheet Metal, Trim Floor Mat
37260-00	1	Sheet Metal, Marquee Hinge (32" Only)
37262-00	1	Bracket, Marquee Base (32" Only)
37263-00	1	Sheet Metal, Marquee Mount (32" Only)
37264-00	1	Sheet Metal, Control Panel
37265-00	1	Bracket, Light
37266-00	1	Bracket, Switch Plate
37267-00	2	Bracket, Switch Mount
37270-00	1	Sheet Metal, Transformer Plate
37322-00	1	Bracket, Motion Stop Safety Switch
37324-00	1	Cover Plate, Wood Pedestal (Non-Motion Only)
40-0740-6V	1	Coin Door Assembly, Mid-Width, with Meter & 4 Service Switches
45083-00	1	Seat & Wood Pedestal Assembly (Non-Motion Only)
49-1019-00	3	PCB Mounting Feet, Set Of 4
50-0244-NDNC	1	Seat Assembly
50-0400-00	1	Seat Slide Kit Assembly
52-6212-00	1	Button Plug, 1.13" Diameter (Non-Motion Only)
555-052-1	1	RJ45, Plug-In Connector
60039-00	1	Computer Mounting Strap

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Mini-Motion Base Replacement Parts

Item Number	Qty	Description
Cables		
115-0204-01	1	Brake Light Cable
115-0221-01	1	Motion STOP Button Output Cable
115-0222-01	1	Power Cable, AC Power Plate to Mini-Motion Base
115-0223-01	1	Power Lead Cable
115-0224-01	1	Ground Lead Cable
115-0225-01	1	Transformer Jumper, White
115-0226-01	1	Transformer Jumper, Black
CBL-0800-X	1	Power Transformer, 115 VAC Input, 230 VAC Output
CBL-0801-X	1	230 VAC from Transformer to Electronics Box
CBL-0802-X	1	Pot to Electronics Box
CBL-0803-X	1	+12/-12 VDC to Electronics Box
CBL-0804-X	1	+12/-12 VDC from Power Supply
CBL-0805-X	1	5K Pot and Cable Assembly
CBL-0806-X	1	Shielded Cable to Motor
USB-EXT-6	1	USB Extension Cable, 6', USB 2.0, A Plug/A Jack
Electronics (User Replaceable)		
2-38-2859	1	Power Transformer, 4A, 110VAC Dual , Second.220VAC
283-2711-ND	1	Fuse, 7A, Electronics Box
ELC-0018-X	1	Pot, Encoder, 5K, 6639-S-502
ELC-0123-X	1	Fuse, AC, 4A w/ Housing (Electronics Box)
990-0080-01	1	Electronics Box Assembly (Replace as Assembly Only)
Electronics Box Components – SERVICABLE BY GLOBAL VR TECHNICIAN ONLY		
CBL-0900-X	1	Fuse, Electronics Box Internal Cable
CBL-0902-X	1	J-2, Electronics Box Internal Cable
CBL-0903-X	1	J-3 & J-4, Electronics Box Internal Cable
CBL-0904-X	1	J-1, Electronics Box Internal Cable
CBL-0905-X	1	J-5, Electronics Box Internal Cable
CBL-0906-X	1	220 VAC to Phase Driver, Electronics Box Internal Cable
CBL-0907-X	1	Phase Driver to Motor, Electronics Box Internal Cable
ELC-0201-X	1	PCB Assembly USB-3101, Digital to Analog Converter
ELC-0500-X	1	Servo Driver, 208/240VAC, 50-60HZ, 1/2HP
ELC-0510-X	1	PCB Assembly, Analog, GVR
37328-00	1	Electronics Box (Box Only)
37329-00	1	Lid, Electronics Box
MA2072-HVL	1	Fan, 220/240 VAC, 70mm X 70mm X 25mm
Q468-ND	1	Power Line Filter, EMI 6A, Panel Mount
Miscellaneous		
26188-00	1	Bellows
37021-00	1	Seat Panel Base
37189-00	1	Woofer Grill
37299-00	1	Weldment, Motion Seat Base
37300-00	1	Motion Seat Platform
37301-00	1	Cover-Seat Platform-Motion Seat
37302-00	1	Weldment, Pivot, Motion Seat
37303-00	1	Clamp, Machined, Motor To Lifter
37304-00	1	Plate,-Machined, Lifter Bearing (Cam)
37305-00	1	Weldment, Lifter
37306-00	1	Potentiometer (Pot) Shaft
37307-00	1	Lifter Shaft
37308-00	1	Block, Mount
37309-00	1	Block, Shim Bearing
37310-00	1	Front Cover Plate

Item Number	Qty	Description
37311-01	1	Left Cover Plate
37311-02	1	Right Cover Plate
37312-00	2	Motor Cover
37313-00	1	Shifter Cut-Out Cover
37316-00	2	Cover Plate Support Bracket
37317-00	2	Connector Bracket, Motion Seat to Display Cabinet
37318-00	1	CCFL Light Mounting Bracket
37319-00	1	Pot Adjustment Plate
37320-00	1	Pot Bracket
37321-00	1	12 V Fan Mounting Bracket
37323-00	4	Bellows Corner Retainer
37330-00	1	Electronics Box Mounting Bracket
73202202	1	Rod End, Female, 1/2-20 W/ 1/2-20 Stud-MSC
CASTER-2.50	4	Caster, 2.50" Diameter, 1.75" X 3.00" Mount Holes, 3.25" High
ELC-0005-1	1	Motion STOP Pushbutton
ELC-0012-1	1	Contact, Block, NC
ELC-0018-X	1	Pot, Encoder, 5K
ELC-0112-1	1	Motion STOP Latch
ELC-0121-X	1	Motor, 1/2HP
FSN-0015-X	4	Leveler, 5/8-11
FSN-0042-X	1	Elastic Coupler for Pot Assy., .25" Diameter, Aluminum
UCFB202	2	Pillow Block w/ 15mm Bearing & 3-Bolt Housing
UCPH202	4	Pillow Block w/ 15mm Bearing

Pedal Assembly

ITEM NO	QTY.	PART NO.	DESCRIPTION
1	1	95-2534-00	PEDAL & BEAM ASSY PERFORATED BREAK CHROME
2	1	95-2520-00	PEDAL & BEAM ASSY PERFORATED GAS CHROME
3	1	50-8372-90	PEDAL FRONT PLATE DUAL SMOOTH BLACK
4	4	50-2588-00	SIDE PLATE RIGHT & LEFT
5	4	50-8171-00	BUMPER
6	8	50-8170-00	SPACER, TUBE
7	1	50-8042-00	SPRING F/PEDAL, RH HELIX
8	2	50-8049-00	SPRING F/PEDAL, LH HELIX
9	2	50-2979-00	PIVOT SHAFT, PAINTLOC
10	2	50-8069-02	GEAR, 1MOD, 12T, .25 BORE
11	2	96-4916-00	LONG LIFE POT W/NUT & WSHR 5K
12	2	95-0925-00	GEAR SEG 1MOD 80T
13	8	43-0726-00	CARRIAGE BOLT, 1/4-20 X .50 BLK OXD.
14	9	43-0075-00	SCREW, M5 X 60MM HHCS
15	2	43-0269-00	SCREW, M6 X 30MM HHCS
16	9	43-0068-00	LOCKWASHER, M5 RIBBED
17	8	90-1209 00	1/4-20 HEX NUT W/KEPS
18	2	43-0983-00	LOCKWASHER M6 RIBBED
19	2	43-0050-00	HEX NUT M4
20	2	43-0051-00	SCREW, M4 X 16 MM HHCS
21	4	43-0198-00	WASHER, M4 FLAT WSH DIN 125A
22	2	43-0277-00	SET SCREW, M4X8MM CUP POINT
23	9	43-0125-00	NUT M5
24	4	50-2587-00	BUSHING .35 DIA 5/16 O.D.
25	2	50-0097-00	WASHER GUIDE 4.38 X 1.75 W/.44 SQ HL BLK PLST
26	1	50-0008-00	COMPRESSION SPRING .94 OD X 2.00 LG x .125 DIA W.
27	1	50-0011-00	CYLINDER & TUBE ASSY., I.T. PEDAL

Drawing © Happ Controls

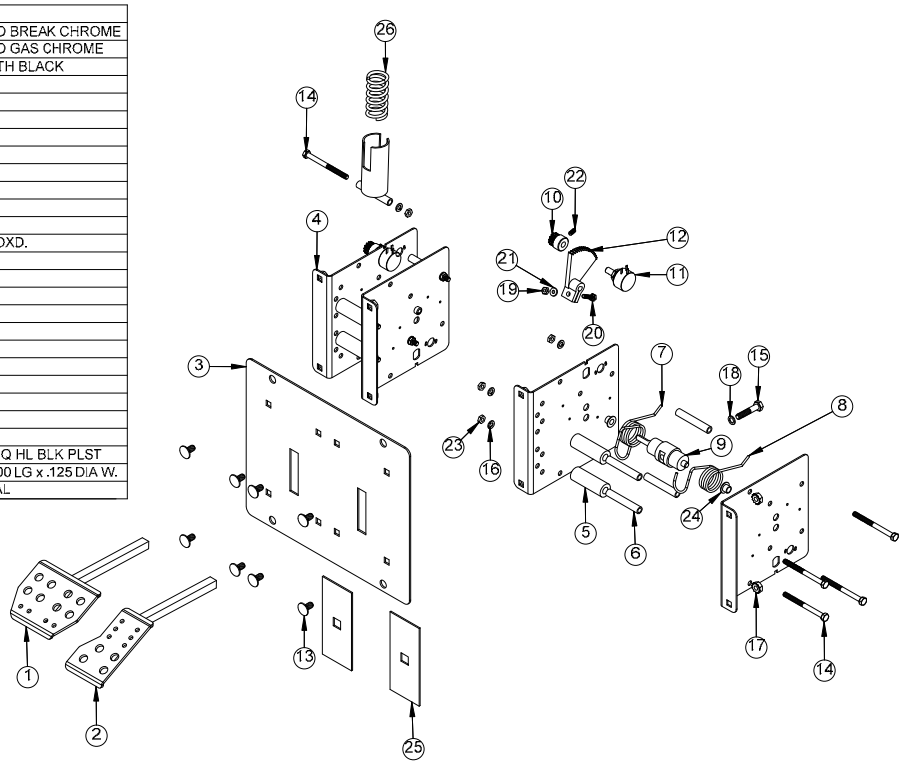

Figure 36. Pedal Assembly Exploded View and Parts

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Steering Assembly

ITEM NO.	QTY.	PART NO.	DESCRIPTION
1	1	43-0341-00	SCREW, 1/4-28 X 1 SHCS
2	1	50-4014-00	SHAFT, 270 DEG. ACTIVE WHEEL
3	1	43-0305-00	KEY, 3/16 SQ. X .74
4	2	43-0232-00	NUT, HEX NYLOCK 1/2-20
5	1	43-0340-00	LOCKWASHER, EXT. M12
6	1	50-2092-00	KEY, SHAFT 4MM x 4MM x 25MM
7	1	43-1170-00	SCREW, #6-32 x 3/8" SHCS
8	1	50-4043-00	MOTOR & CONNECTOR ASY.
9	1	50-4016-00	WHEEL MTG. BRACKET
10	1	50-8129-00	BEARING HOUSING
11	2	50-8130-00	BEARING, .59 ID X 1.259 OD
12	1	50-8455-00	MOTOR MTG. BRACKET
13	1	50-2659-00	BEARING SPACER
14	1	50-4040-PL	PULLEY, 16T 1/5 PITCH, PLASTIC
15	4	43-0188-00	SCREW, #8-32 x 3/8" HEX WASHER HD
16	1	43-0576-00	SCREW, M6 x 60MM HHCS
17	1	90-1208-00	FLAT WASHER, 1/4 I.D.
18	1	50-2545-00	BRACKET, BELT TENSIONER
19	4	42-0093-00	NUT 10-32 HEX W/SEMS, ZINC PLTD
20	2	43-0117-00	HEX HD CAP SCREW M10x30,GR 8.8
21	2	43-0978-00	SCREW, M10 x 40MM HHCS
22	1	50-8145-00	DIE CAST WHEEL STOP, W/BUMPERS
23	4	43-0034-00	LOCKWASHER M10 RIBBED
24	4	43-0035-00	NUT HEX M10
25	1	50-4045-PL	STOPPER PIE CAM & PLASTIC PULLEY
26	1	50-4041-00	TIMING BELT, BLACK 3/8" WIDE
27	1	50-2670-00	5K POT, NEI "SENSORCUBE"
28	1	43-0018-00	LOCKWASHER, INT. 3/8" x 9/16"
29	1	43-0014-00	HEX NUT 3/8"-24 X 3/32 THK
30	1	50-4018-00	POT. MTG. BRACKET
31	1	50-4032-00	SPACER, POT MTG. BRACKET
32	1	43-0184-00	SCREW, #10-32 x 3/8" PHPNHD
33	1	43-0995-00	#10 FLAT WASHER
34	1	43-0735-00	SCREW, M4 X 12 SHCS
35	1	50-2511-00	ATARI GAMES PATENT DECAL
37	1	50-2525-00	SPLIT HUB FOR 5/8" SHAFT & 1/4-20 TAP
38	1	50-1035-00HD	HOOP, SOFT RUBBER TYPE 60 DUROM
39	1	50-2715-00	CAP WITH CHECKERED FLAGS LOGO
40	3	43-0328-00	SCREW, 1/4-20 X .75" SOCKET HD CAP B.O.
41	6	43-0284-00	SCREW, 8-32 X 1/2 TORX TP B.H.
42	1	43-1554-00	STAR WASHER M14 EXTERNAL TOOTH

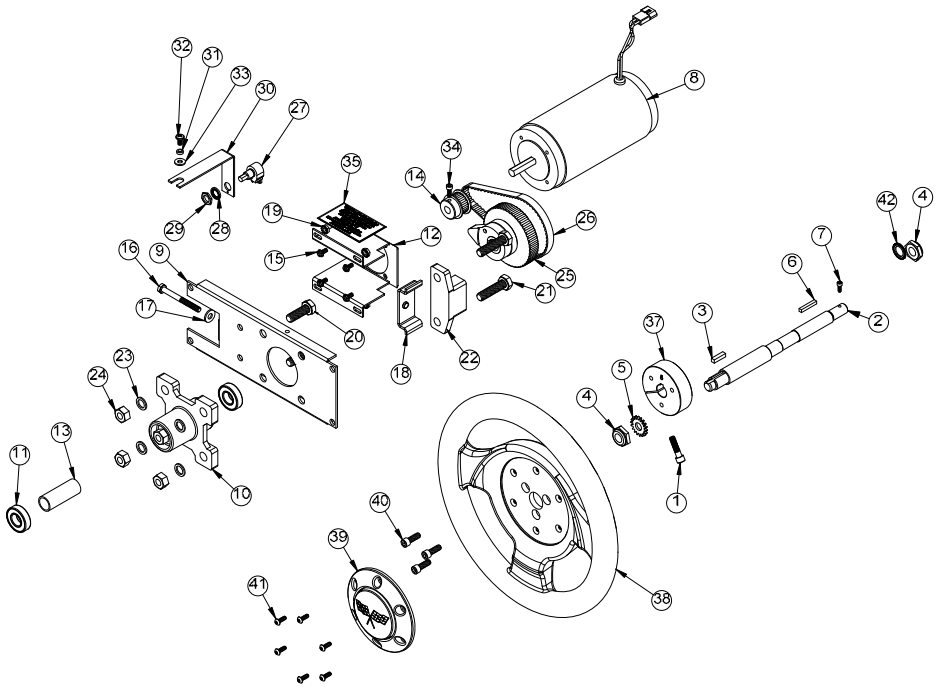

Figure 37. Steering Assembly Exploded View and Parts

Artwork Identification (42" Mini-Motion Cabinet)

Figure 38. 42" Mini-Motion Cabinet Artwork

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Artwork Identification (42" Deluxe Cabinet)

Figure 39. 42"Deluxe Cabinet Artwork

Artwork Identification (32" Standard Cabinet)

Figure 40. 32" Standard Cabinet Artwork

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Chapter 8 — Diagrams and Schematics

Note: You can download Cabinet Assembly Drawings from **http://service.globalvr.com/twisted.asp**.

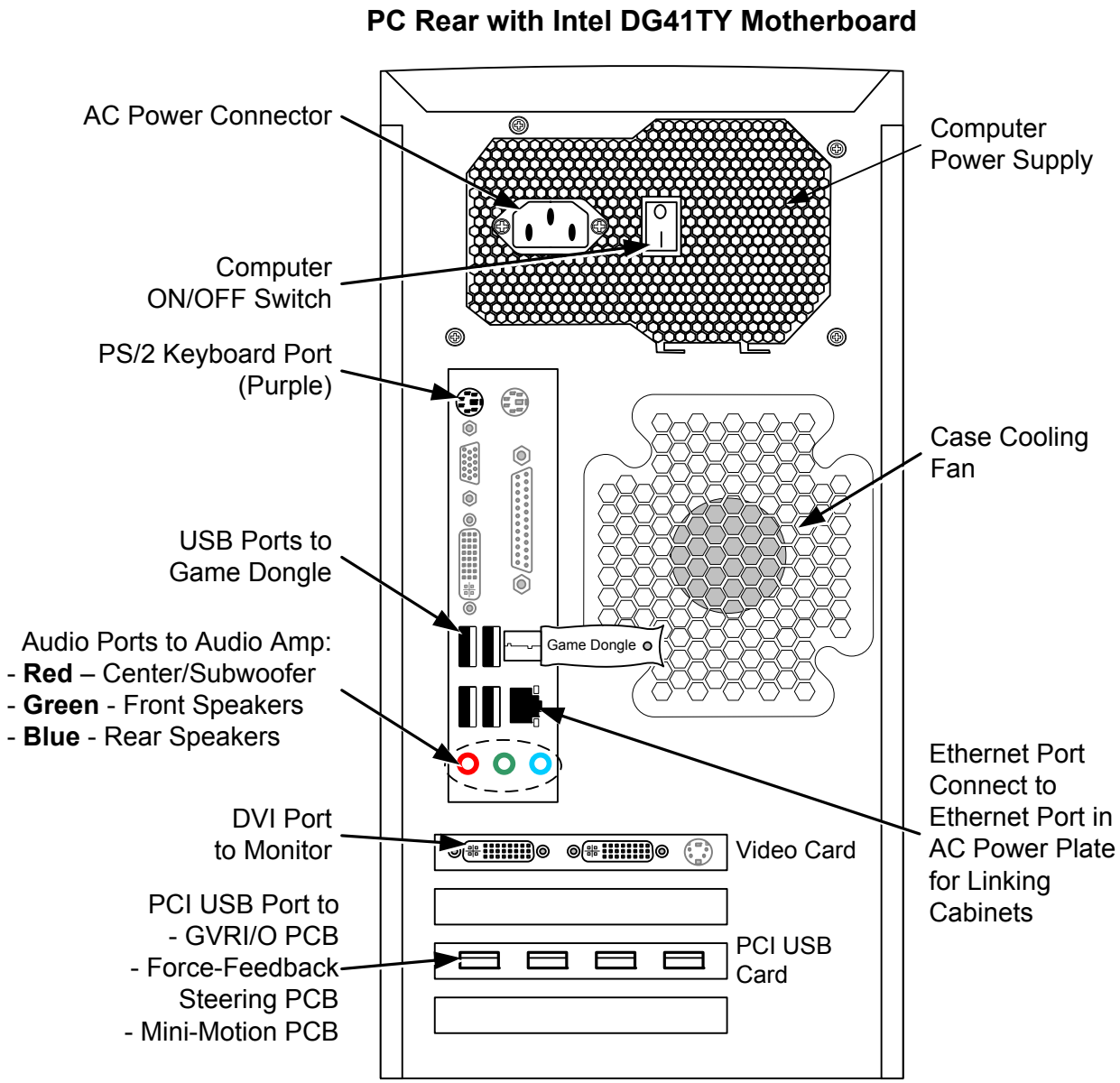
PC Rear with Intel DG41TY Motherboard
AC Power Connector
Computer Power Supply
Computer ON/OFF Switch
PS/2 Keyboard Port (Purple)
Case Cooling Fan
USB Ports to Game Dongle
Game Dongle
Audio Ports to Audio Amp:
- Red – Center/Subwoofer
- Green - Front Speakers
- Blue - Rear Speakers
Ethernet Port Connect to Ethernet Port in AC Power Plate for Linking Cabinets
DVI Port to Monitor
Video Card
PCI USB Port to
- GVRI/O PCB
- Force-Feedback Steering PCB
- Mini-Motion PCB
PCI USB Card

Figure 41. Computer Rear Panel

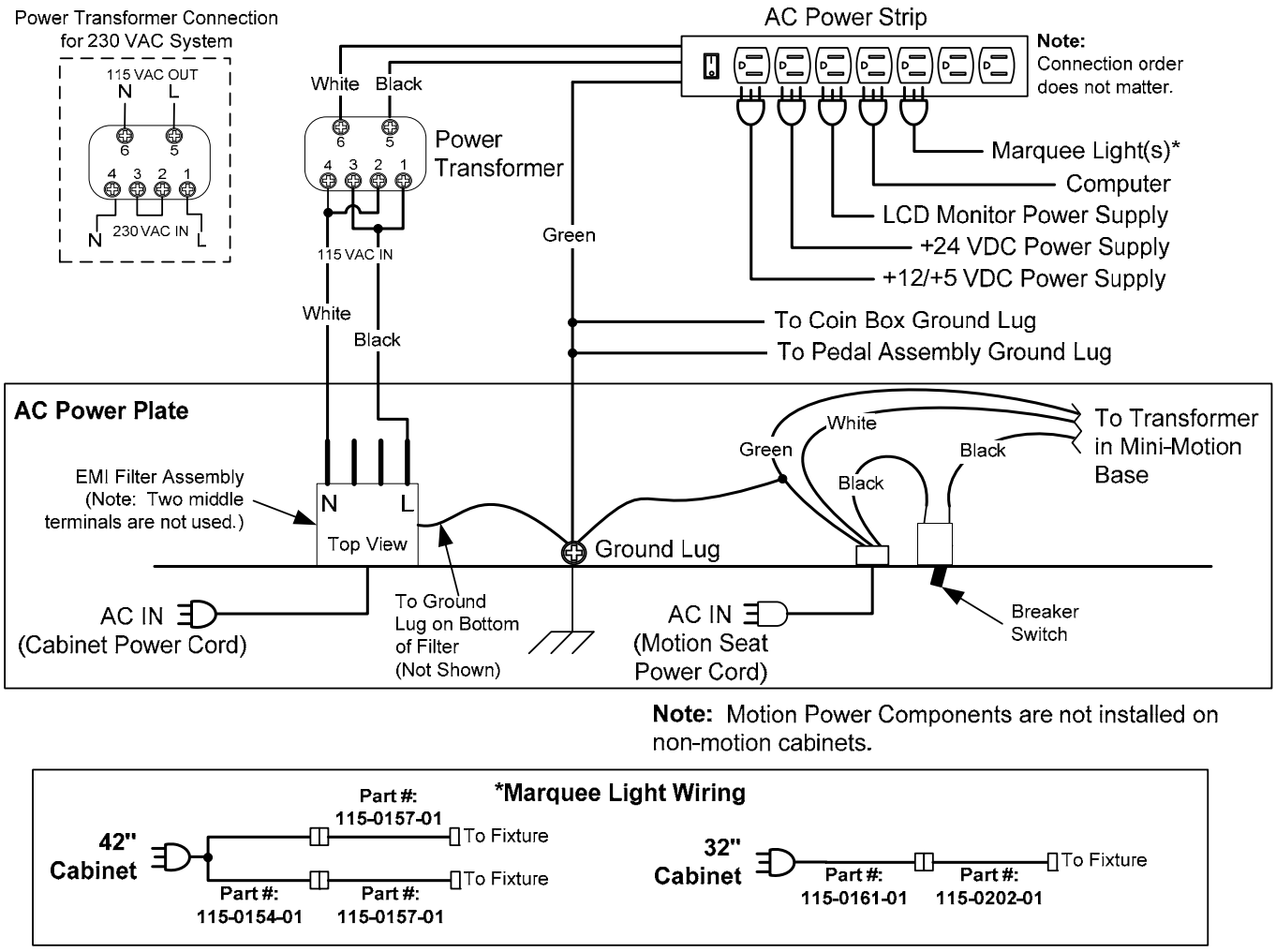

Figure 42. AC Power Distribution Diagram

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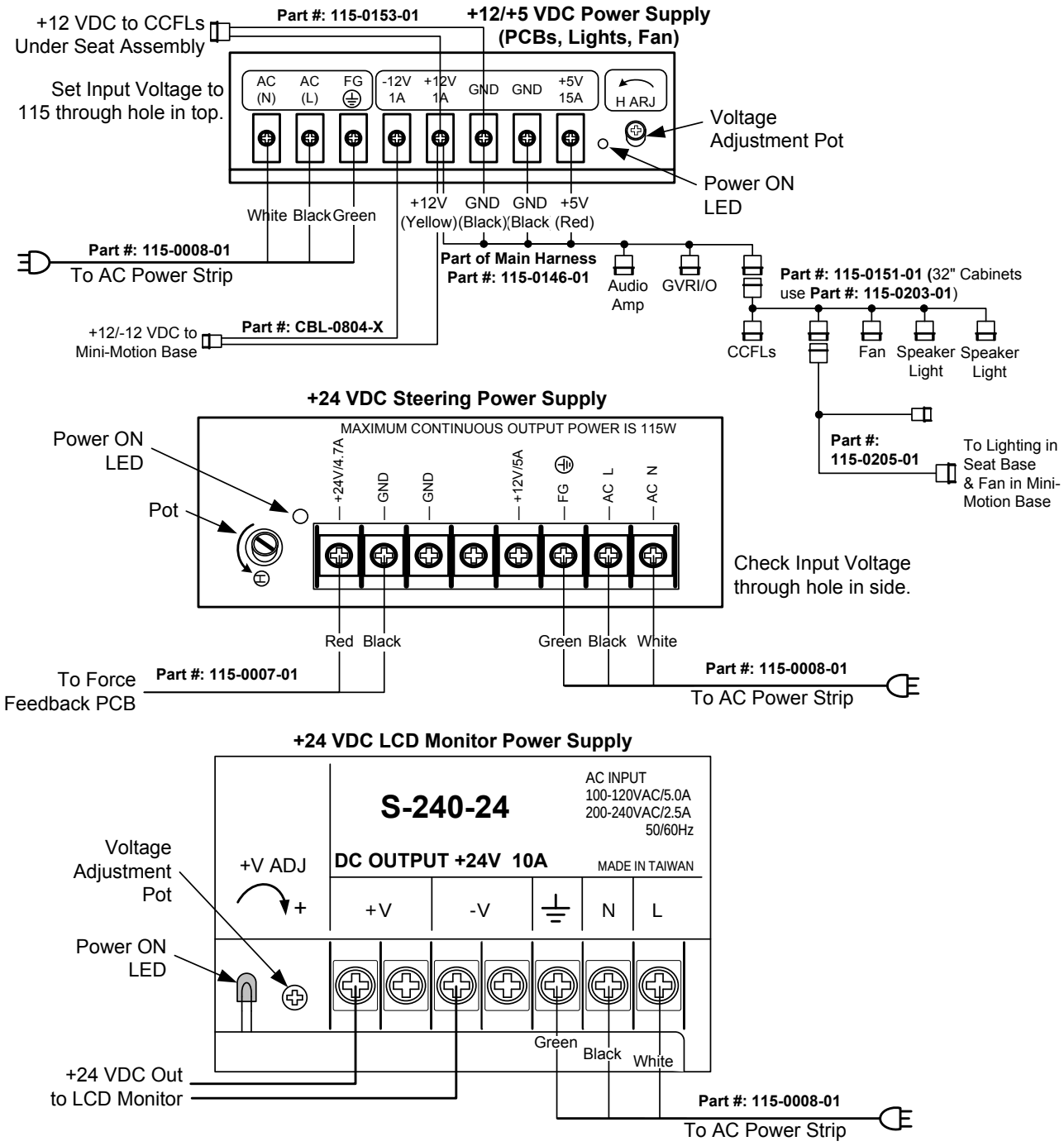

Figure 43. DC Power Distribution Diagram

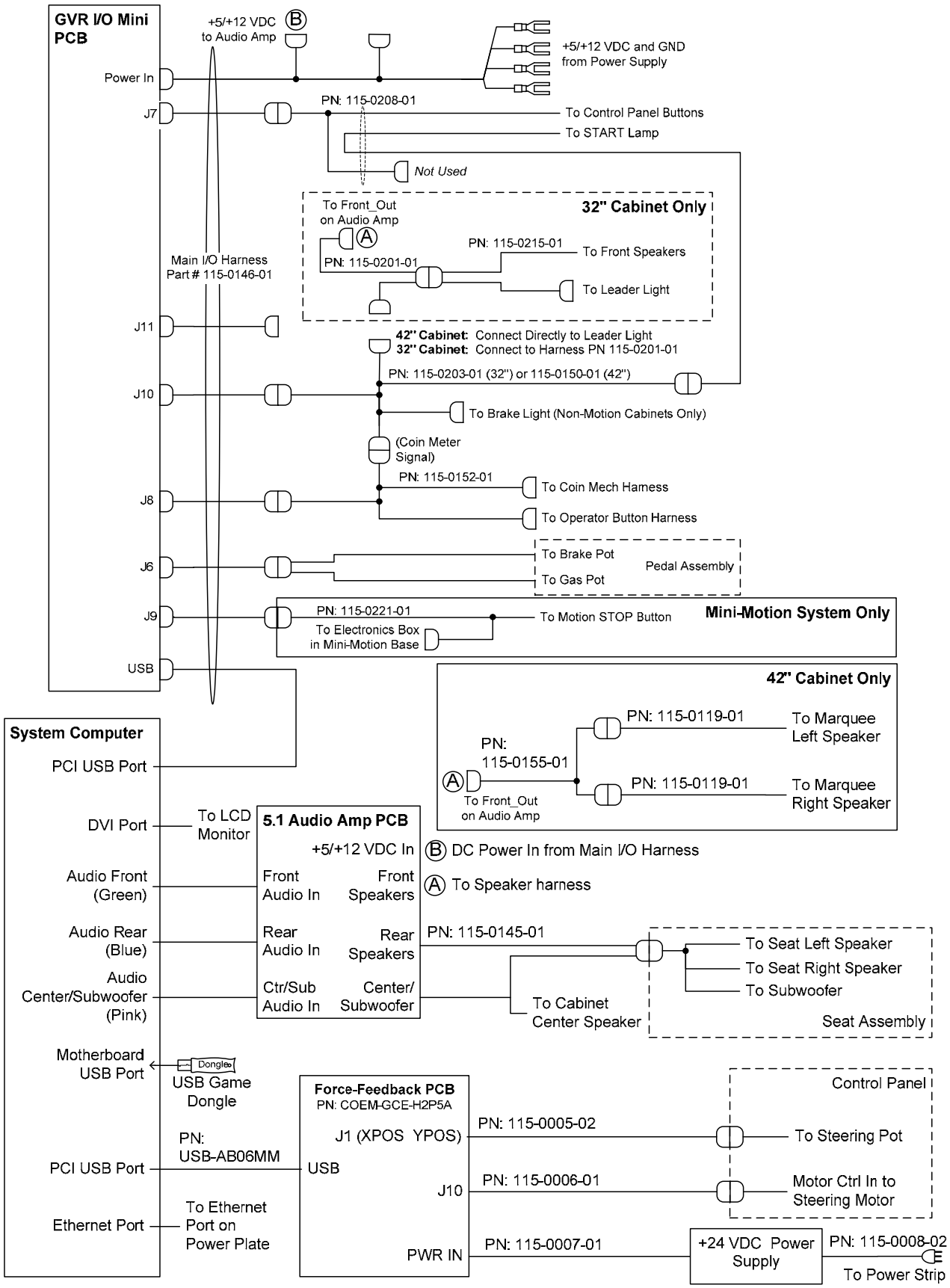

Figure 44. Simplified Wiring Diagram

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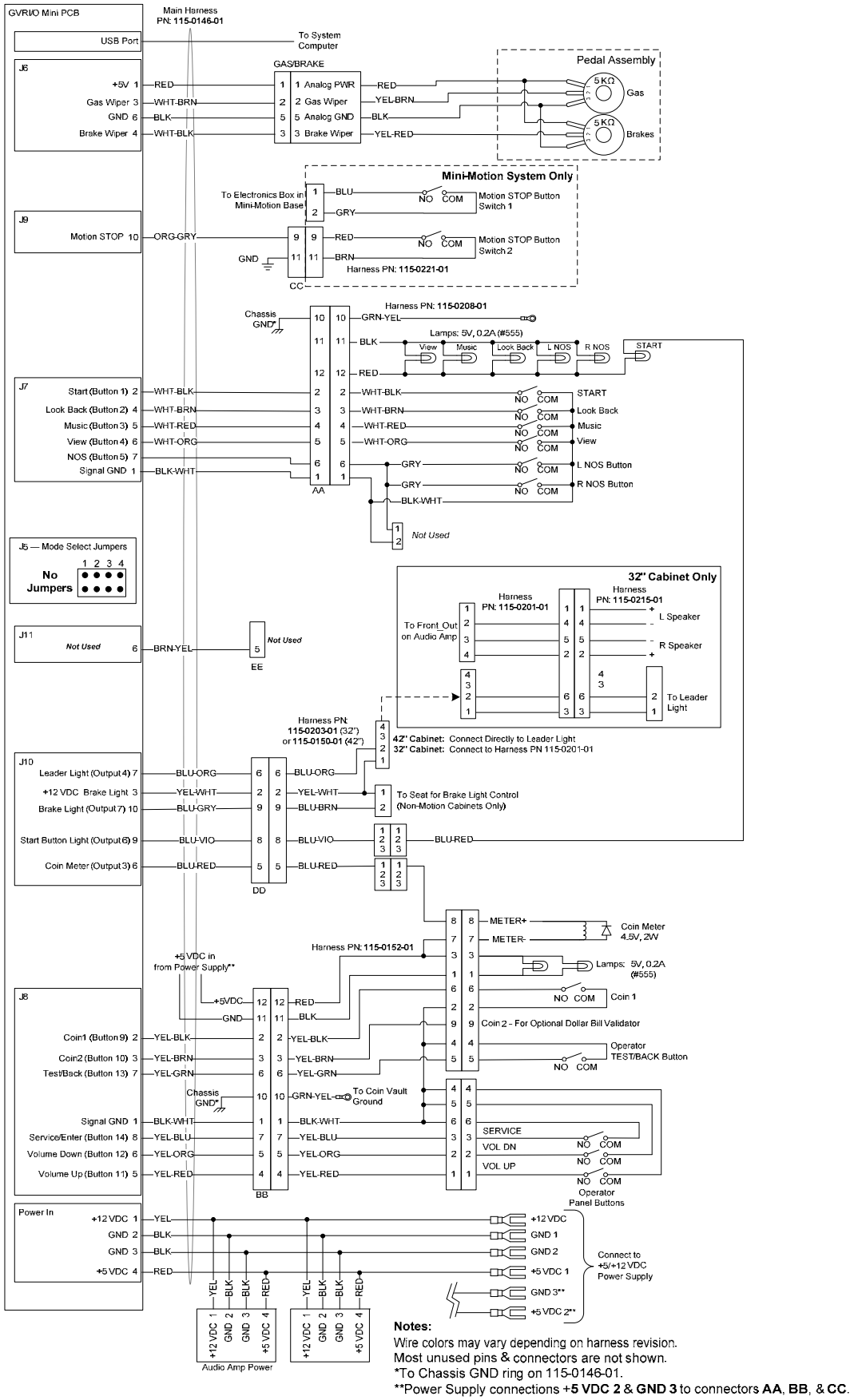

Figure 45. Detailed Wiring Diagram

Warranty Service

If you should require warranty service, please contact your authorized GLOBAL VR® distributor.

LIMITED WARRANTY

LIMITED WARRANTY for **Twisted — Nitro Stunt Racing** (North America Only)

GLOBAL VR® warrants that its Major Electronic Components are free from defects in materials and workmanship under normal use and service for a period of one (1) year from the date of sale.

All software and accompanying documentation furnished with, or as part of the Product, is supplied "AS IS" with no warranty of any kind except where expressly provided otherwise in any documentation or license agreement furnished with the Product.

During the warranty period, GLOBAL VR® will, at no charge, repair the Product, provided:

- Purchaser believes that the Product is defective in material or workmanship and promptly notifies GLOBAL VR® in writing with an explanation of the claim;
- All claims for warranty service are made within the warranty period;
- Products are returned adequately packed and freight prepaid to GLOBAL VR®'s designated service center;
- GLOBAL VR®'s inspection or test of the Product verifies to GLOBAL VR®'s satisfaction that the alleged defect(s) existed and were not caused by accident, misuse, neglect, unauthorized or attempted repair or testing, unauthorized modification, incorrect installation, vandalism, failure to follow the maintenance schedule or procedures; or operation in out-of-specification environmental conditions.

GLOBAL VR® will return the repaired Product freight prepaid to the Purchaser. All freight costs associated with replacement of warranty parts after expiration of the original warranty period are the responsibility of the Purchaser. GLOBAL VR® is not obligated to provide the Purchaser with a substitute unit or on-site service during the warranty period or at any time. If after investigation GLOBAL VR® determines that the reported problem was not covered by the warranty, Purchaser shall pay GLOBAL VR® for the cost of investigating the problem at its then prevailing per incident billing rate. No repair or replacement of any Product or part therein shall extend the warranty period as to the entire Product. The warranty on the repaired part shall be in effect for the remainder of the original warranty period, but will not exceed the original warranty period.

Purchaser's exclusive remedy and GLOBAL VR®'s sole obligation is to supply or pay for all labor necessary to repair any Product found to be defective within the warranty period and to supply, at no extra charge, new or rebuilt replacements for defective parts. If repair or replacement fails to remedy the defect, then, and only in such event, shall GLOBAL VR® refund to Purchaser the purchase price for said Product. Purchaser's failure to make a claim as provided above or continued use of the Product shall constitute an unqualified acceptance of said Product and a waiver by Purchaser of all claims thereto.

IN NO EVENT SHALL GLOBAL VR® BE LIABLE FOR LOSS OF PROFITS, LOSS OF USE, INCIDENTAL OR CONSEQUENTIAL DAMAGES RESULTING FROM OPERATION OF THE GAME IN ANY CONDITION. GLOBAL VR® SHALL NOT BE RESPONSIBLE FOR THE SUITABILITY, PERFORMANCE, OR SAFETY OF ANY NON- GLOBAL VR® PART OR ANY MODIFICATION PERFORMED BY ANY PRODUCT DISTRIBUTOR UNLESS SUCH WORK IS EXPRESSLY AUTHORIZED IN ADVANCE BY GLOBAL VR®.

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Technical Support

Service & Parts

Hours: 7:00AM–5:00PM Pacific Time, Monday–Friday
Phone: 408.597.3435
Fax: 408.597.3437
E-mail: techsupport@globalvr.com
Website: http://service.globalvr.com
Extended Service Hours: Monday–Friday 5pm—Midnight
Saturday & Sunday 7:00am—Midnight Pacific Time

Purchase selected parts online at http://parts.globalvr.com.

Free telephone, e-mail, and online support are provided for systems during the warranty period. GLOBAL VR® Technical Support can help you troubleshoot problems and diagnose defective parts. We can also answer questions about the operation of your game.

When you contact Technical Support, please provide the information listed below to assist the Technical Support representative in solving your problem quickly. For your convenience, space is provided to write important numbers.

- Cabinet Serial Number: _____
- Game Version (from Operator Menu): _____
- OS Version (from Operator Menu): _____
- Dongle Version (from Operator Menu): _____
- IO Board Version (From Operator Menu): _____
- Your mailing address and telephone number.
- A summary of the question or a detailed description of the problem with your cabinet.

The additional information listed below, as applicable, may assist Technical Support in solving your problem quickly.

- Specific error message
- Any changes made to the system
- Date of latest install or upgrade
- For game-play issues, the game mode and number of players

To comment on this manual, please e-mail: techpubs@globalvr.com